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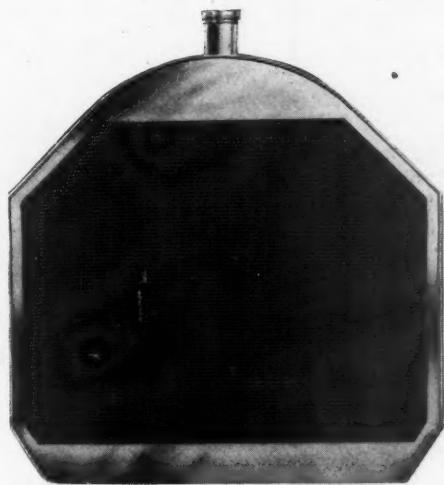
MOTOR AGE

VOLUME XXI

CHICAGO, MAY 30, 1912

NUMBER 22

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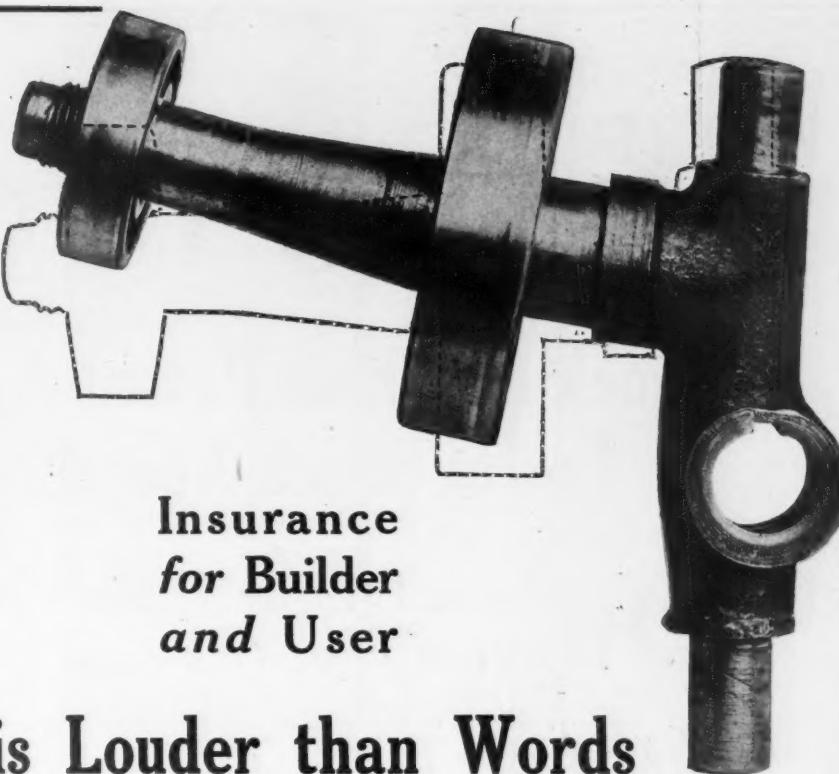
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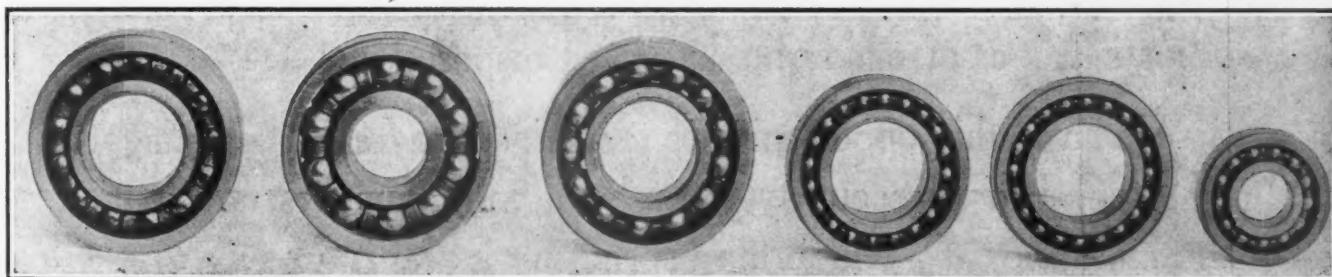
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NOTICE

Shock Absorber Patent Again Sustained Foster Shock Absorber Enjoined

ON May 4, 1912, the District Court for the Southern District of New York again affirmed the validity of the Truffault Patent, and held that the FOSTER SHOCK ABSORBER was an infringement, and issued an injunction restraining its further manufacture, sale and use. Thus another infringer of our rights has been disposed of.

We take this opportunity of repeating our former warning that we shall prosecute vigorously all infringements now on the market or any which may spring up in the future.

HARTFORD SUSPENSION COMPANY

Makers of the Truffault-Hartford Shock Absorber

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Truffault-Hartford
SHOCK ABSORBER



MOTOR AGE
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**NOTE COMPACT
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MOTOR AGE

Making an Indianapolis Motor Marathon

INDIANAPOLIS, Ind., May 28—Few of the thousands who witness the 500-mile race at Indianapolis Thursday stop to think of the months of preparation and the vast outlay in money represented in the few hours of frenzied speed of this one day. To get speedway and cars ready and to stage the contest has meant the expenditure of more than \$300,000; this without counting the money tied up in the land and buildings or the cost of building the cars. To the promoters of a 500-mile race it means the expenditure of \$75,000 while the entrants of the cars spend in the neighborhood of \$225,000 before the victor crosses the tape on his last lap.

Vast Sums Expended

Chief among the items on the debit side of the promoter's ledger is that of the prize money. Of the \$50,000 that this involves, \$10,000 is balanced by the entrance fees of the cars. The other \$35,000, aside from the prizes, is divided somewhat as follows: Advertising and general publicity, \$7,000; supplies incidental to the race, \$4,000; payment of the officials and help, \$1,500, and the fee for the sanction of the American Automobile Association, \$1,000.

The advertising and publicity expense include the preparation, printing and distribution of the posters, the preparation and mailing of photographs and reading matter to the daily press throughout the country and to the other periodicals, the employment of a brilliant and resourceful

What it Means to Stage a 500-Mile Meet—Contest Costs Over \$300,000—Unsung Heroes of Pits Decide Race's Outcome

By Darwin S. Hatch



publicity man and a staff of assistants who will see that the coming event is kept constantly in the public eye.

The item of \$1,500 in wages of the workmen and salaries and expenses of the officials seems a small one when it is considered that it requires the work of 1,800 people to run the race and provide for the comfort and safety of the spectators. Not all of these, however, are an item of expense to the promoter, for many of them are the concession workers who minister to the creature comforts and souvenir gathering propensities of the grand stand.

This does, however, include the army of workmen who for weeks had been working on the brick course to give it an even but not too smooth a surface for the rubber-shod iron steeds that must spend hours in endless circlings of the 2½-mile oval in getting into condition for the supreme test of speed on Memorial day.

Care of the Speedway

In addition to these there have been the men who put into condition the wooden buildings which form the training camps. Other men who repair the grand stand after its 12 months' neglect. The grand stands must be protected by heavy wire netting from the possible onslaught of a thrown tire. The grounds must be continually patrolled by watchmen and the camps where the precious racing machines are housed must be guarded from malicious or careless hands. But it is on the day of the race that the real army of workers appear. There must be fifty or more ticket sellers and half as many gate-keepers; 100 ushers to see that the spectators



are seated correctly. The course must be patrolled by armed guards of the state militia, who cover every foot of it to prevent irresponsibles from risking their own necks and those of the pilots behind the steering wheels of the hurtling monsters on the track.

None of the expense connected with the race considers the amount tied up in the

actual plant itself which for 364 days of the year is practically deserted but on 1 day becomes the mecca of motor enthusiasts.

The brick track alone above its cement foundation represented the expenditure of over \$80,000, grand stand and boxes have been erected which have an estimated seating capacity of 40,000 people. A heavy cement wall which protected the pits last year has been lengthened so that if a car becomes uncontrollable it cannot crash into the pits.

Preparing the Racers

From the entrant's point of view the contest is an expensive proposition, if he is not lucky enough to be one of the first two or three to finish, and if he should be so unlucky as to seriously damage the car the race to him is materially increased. The manager of one of the most successful racing teams estimates that it costs \$8,000 to prepare a car and get it ready for the race, and this car is one of those made in an Indianapolis factory, so that the cost of transportation of the car and crew and the maintenance of a training camp are not considered in these figures. Where a training camp must be maintained it is estimated that \$10,000 will no more than cover the expense of putting a car through the 500-mile grind.

For weeks before the day of the race there has been established at the track a training camp with a crew of skilled mechanics from the factory to assist the driver and mechanic in grooming their mounts to the very pink of condition for the race. Change after change is made in some small part until just the right adjustment is found which gives the greatest speed or the least wear. After each slight alteration in any feature of the motor or running gear the car is taken out and under the skilled hands of its pilot it is

1—David Bruce-Brown, National; 2—Joe Matson, Lozier; 3—Hughie Hughes, Mercer; 4—W. Liesaw, Marquette-Buick; 5—Harvey Herrick, Case; 6—Gil Anderson, Stutz; 7—Joe Horan, Lozier; 8—Bill Endicott, Schacht; 9—Eddie Hearne, Case; 10—Johnny Jenkins, White; 11—Lee Frayer, Firestone-Columbus; 12—Mel Marquette, McFarlan; 13—Harry Knight, Lexington



put through its paces until the driver is sure that each separate unit is working to the greatest possible efficiency. Transmission parts are changed, experiments are tried with various gear ratios until the best are found, shock absorbers, carburetors, magneto, and other accessories are tried, changed, adjusted until all are sure each accessory is doing its full duty. When the main features of the car have been decided upon and finally installed, the car is taken out for a final workout just as the thoroughbred horse is given the most careful driving the day before his biggest race. And in just the same way the metal steed is given a careful and loving grooming while still sweating oil after the return to camp from its workout on the track.

Tuning Up the Cars

The car is thoroughly gone over for evidences of looseness or binding parts. After its long final tryout, and whatever slight adjustments that seem to be needed are made, traces of carbon are removed from the cylinders, springs tightened up, valves readjusted and perhaps ground to a better seat in oil; electrical, water, oil and fuel connections inspected for evidences of leaks or weakness until with a final slap on its dusty hood the driver declares himself satisfied with his mount.

All the time that the mechanics and helpers have been working at the camp on the car they have been undergoing a rigid schooling under a drill master who knows that upon their obedience to his orders may depend success or failure in the race. These men have been in training for their work at the pits during the contest and it is often at the pits as much as at the steering wheel that a race is won or lost. The speed at which pit men work counts for much in victory. There is as much care and skill used in laying out the system by which the men in the pits are to work as would be used by a general in

deploying his men and laying his field pieces for a battle. The squad of men for each car in a pit usually consists of four or six men and the pit manager. Two of these men have become specialists in the quick replacement of tires, others in replenishing the oil, water and gasoline tanks.

Even before the start of the race, the

1—Ralph Mulford, Knox; 2—Teddy Tetzlaff, Fiat; 3—Ralph de Palma, Mercedes; 4—Len Zengel, Stutz; 5—Harry Endicott, Schacht; 6—Joe Dawson, National; 7—Bob Burman, Cutting; 8—Howard Wilcox, National; 9—Spencer Wishart, Mercedes; 10—Bert Dingley, Simplex; 11—Charles Merz, Stutz; 12—Don Herr, National; 13—Louis Disbrow, Case, and captain of team

men in the pits have become almost obscured from the grandstands by a cloud of smoke from the cars as they are lined up for the start. But behind this pall they are tensely waiting a signal from the one of the circling monsters that is in their charge.

Long before the car has reached the pits the mechanician in it has signaled just what is necessary and, if it is tires, before the car has stopped opposite its number in front of the grand stand, two men have jumped over the pit wall and almost before the wheels have stopped revolving has one of them jacked up while the other man is loosening the bolts and wedges which hold the rim on the wheel. By the time the rim is off, the other tire man is ready with a new tire on a new rim, with the tire already inflated, and it is dropped into place, the wedges tightened up with a quick jerk and the car is away again. Perhaps water or oil or gasoline have also been in need of replenishment. In the 60 seconds that it has taken to replace the tire all the tanks have been refilled with fresh supplies, so that with ordinary fortune continuous running will depend only on the life of the tires.

PACIFIC HIGHWAY IMPROVED

Seattle, Wash., May 25—Road conditions over the Pacific highway route from San Francisco to Seattle are very much better at the present time than they have ever been in any previous year, according to information just given out by Frank M. Fretwell, secretary of the Pacific Highway association, who has just returned from a 2 weeks' trip extending as far south as San Diego.

In addition to investigating conditions that affect touring, Mr. Fretwell marked the Pacific highway from Redding to the Oregon line. With the completion of this stretch of the Pacific highway, markers now indicate the international thoroughfare from Vancouver, B. C., to Redding, Cal., and as the California roads out of Redding are well marked with local signs, all kinds of traffic traveling north and south in the three states and the province of British Columbia will have no trouble in finding their way through the country, whether or not they wish to drive just a few miles up or down the entire coast.

Already cars are coming from California to the northern city. An E-M-F has just completed the trip from San Francisco to Seattle with no difficulty and this will have a tendency to encourage many others who have been dubious as to road conditions.

The road between Redding and Dunsuir, Cal., which always held a great many terrors for motorists, is in very good condition and is safe for comfortable auto travel for the rest of the season. It is true that a few miles north of Kennett the road is narrow and requires careful driving, but this will soon be widened out and the grade now established does not exceed 7 per cent on this new road.

Crucial Test of Racers

Candidates for Honors in 500-Mile Race Put Through Eliminating Trials on Indianapolis Speedway—Bruce-Brown in National Makes Fastest Lap On Monday

INDIANAPOLIS, IND., May 27—Special telegram—In the elimination speed trials on the speedway today for the 500-mile race Thursday, twenty-one of the twenty-two cars that attempted the 75-mile an hour pace qualified, the only one to fall by the wayside being No. 27, Continental. Trials will be continued from 10 until 12 noon Tuesday. Mulford had to wait for new wheels and one of the Cases and the Opel did not show up. The Shambaugh has officially withdrawn.

Of those to qualify, Bruce-Brown carried off premier honors by sending his National around the 2½-mile track at 88.5 miles per hour. Close after him was Wilcox, another National, who did 87; Dawson in the third National, and dePalma in the Mercedes tied at 86. The complete time follows:

No.	Driver	Time	Speed
1	Anderson	1:51.20	81.
2	Zengle	1:54.14	78.5
3	Tetzlaff	1:46.83	84.5
4	De Palma	1:44.62	86.
5	Disbrow	1:57.55	76.5
6	To try Tuesday		
7	Wishart	1:47.20	84.
8	Dawson	1:44.49	86.
9	Wilcox	1:43.20	87.
10	Knight	1:58.54	76.
12	Dingley	1:51.21	81.
14	Jenkins	1:51.35	81.
15	Burman	1:47.00	84.
16	Frayer	1:56.42	77.
17	Liesaw	1:56.11	77.5
18	Endicott	1:51.70	80.5
19	To try Tuesday		
21	Hughes	1:50.00	81.5
22	Horan	1:51.82	80.5
23	Marquette	1:53.26	79.5
24	To try Tuesday		
25	Matson	1:52.64	80.
26	Withdrawn		
27	Romine	2:11.00	68.5
28	Merz	1:55.09	78.
29	Bruce-Brown	1:41.75	88.5
31	Kilpatrick	To try Tuesday	

In analyzing the times made today it is seen that four made over 85 miles per hour, nine went between 80 and 84 miles per hour, or thirteen averaged over 80 miles per hour in time trials. The Nationals as a team carried off the high averages, as the three cars average 87.17 miles per hour.

Of the twenty-five drivers who will start as chief pilots in this year's big race, eighteen drove in last year's event, leaving only seven new men for this year.

The twenty-five cars entered in this race divide themselves into three natural divisions, one-third are speed kings, one-third are in a middle class and one-third may best be described as pluggers. Last year's race had forty starters, this year's race will probably have twenty-five.

DALLAS HAS BIG PARADE

Dallas, Texas, May 23—What is termed the greatest motor parade ever witnessed in the United States was seen in Dallas Monday when 1,500 cars, conveying thousands of people, passed down the streets of Dallas. The event was to convey visiting

advertising men who were attending the annual meeting of the Associated Advertising Clubs to the beautiful golf and country club grounds 3 miles north of the city.

The parade moved without an accident of any kind. Dealers from various sections of the United States attending the convention declared it to be one of the greatest parades they had ever witnessed. The parade was in charge of President George W. Baker, of the Texas Automobile Association. A moving picture of the parade was taken and these will be shown throughout the world. Many eastern and southern cities were represented.

SUNFLOWER TRAIL RUN

Beloit, Kans., May 25—One of the most successful sociability runs was held on the Beloit to Salina cut-off of the Sunflower trail May 17. The officers of the Sunflower trail and the official logging party of the cut-off made the run for the purpose of establishing this cut-off between the Golden Belt highway west from Kansas City between Salina to Beloit on the Sunflower trail so as to enable the tourists of Denver, Cheyenne, the Yellowstone park country and the Pacific northwest to take advantage of the motor road maintained as the Sunflower trail through Beloit to the trans-continental routes of Nebraska and westward at Minden, Nebraska, on the Omaha-Denver trans-continental route and Kearney, Neb., on the Platte valley route.

One hundred fifty-four cars containing more than 750 persons, composed of the car owners and families and their friends, took part in the run which left Beloit at 8 o'clock in the morning, passed through Simpson, Glasco, Delphos, making the noon control at Minneapolis and reaching Salina at 3 o'clock in the afternoon.

TWYFORD LOCATES IN TEXAS

Houston, Texas, May 18—The Twyford Auto Mfg. Co., which has been organized with a capital stock of \$400,000, recently purchased a factory site in South Houston. The car which the company will manufacture will use the Twyford four-wheel drive. It has rigid worm steering gear, free from swivel or knuckle joints, and it has an oscillating front axle, enabling it to turn as if it were a buggy or wagon. The inventor declares that no object in the road will cause the front wheel to swerve. The officers of the company are: Monta J. Moore, president; J. M. Groesbeck, vice-president; Monta J. Moore, Jr., secretary and treasurer; R. E. Twyford, who is the inventor of the new car, superintendent.

Milwaukee Picks Course

Greenfield Circuit Selected for Vanderbilt and Grand Prix Road Races—Labor Day Date Desired—Contest Board of A. A. A. Insists on 3 Days Between Events

MILWAUKEE, Wis., May 28—The Greenfield course, looked upon as the favorite route for the 1912 running of the Vanderbilt cup and grand prix races and the road contests for the Pabst Blue Ribbon and Wisconsin Motor trophies, ever since the Milwaukee Automobile Dealers' Association started searching for a suitable circuit, was officially chosen by the racing committee today. Ten crews of road builders will start work on the course on Saturday morning, June 1, and hope to complete the reconstruction by July 31.

The final selection was not made until every person owning property along the roads which make up the Greenfield circuit gave their legal consent to the running of high-speed motor contests on the highways for a period of 3 years, beginning in September, 1912. This proviso in the contract assures 3 years of national racing in Milwaukee and makes certain of a race course that will be the equal, or better, of any road course in the world, as it will be built not for 1 year of racing, but for 3.

By putting ten crews on the roads, the work will be expedited; for each crew will have approximately 1 mile of road to rebuild. This also gives opportunity for reconstructing first one-half of the road and then the other, eliminating the necessity of stopping traffic. The roads constituting the course are all principal highways leading into Milwaukee. The Wisconsin highway commission will superintend the construction work.

The matter of dates probably also will be settled at Indianapolis. The M. A. D. A. is holding strongly for Labor Day, and will try to induce Carl Fisher to cut out his proposed Labor Day meet on the speedway. If he does so, the Vanderbilt would probably be run August 31 and the grand prix on September 2, with the Pabst Blue Ribbon and Wisconsin Motor events distributed as is customary.

The Greenfield course has already been described in Motor Age. It is 10.7 miles in length, according to unofficial speedometer reading, and lies wholly within the township of Greenfield, Milwaukee county, just southwest of the city of Milwaukee. No point on the course is further than 7 miles from the city. The course is diamond-shaped, comprising parts of the Janesville plank road, Beloit road, Smith roads, and $\frac{1}{2}$ mile of Lincoln avenue, the south city limits of West Allis, the big manufacturing suburb of Milwaukee.

The city council of West Allis on May 25 adopted resolutions that the part of

Lincoln avenue desired for the course be reconstructed at once, that permission for motor racing be given for the period the M. A. D. A. selects, and that the city give its utmost co-operation to care for visitors and make the carnival a big success. West Allis is a city of 12,000 inhabitants, although founded only ten years ago, when the Allis-Chalmers Co. built the largest machinery works in the world in the city.

CONTEST BOARD'S VIEWS

New York, May 28—Dates for the running of the Vanderbilt cup race and grand prize have not been set so far, despite the numerous reports to the contrary that have been circulated recently. The situation as officially explained by the contest board of the American Automobile Association is that the races must not be run less than 3 days apart and the dates should be about midway between the other fixtures that have been definitely established.

The Elgin races scheduled for August 24 are too close to September 2 to allow time for practice on the Milwaukee course after the Elgin events have been run. This would be considered an excellent reason for not sanctioning the Vanderbilt for September 2, even if that date, Labor Day, had not been set off to Indianapolis.

The date for running the Vanderbilt cannot be set until that for the grand prize has been determined. Notice to the effect that the races must be run at least 3 days apart has been sent to the Milwaukee dealers' body, which is handling the contests, and with it went a suggestion that September 17 and 21 would be appropriate dates for the double bill.

In that case the Milwaukee races would come about half way between the Labor Day date at Indianapolis and the tentative Fairmount Park date, October 5. While there is still some doubt as to the probabilities both at Indianapolis and Philadelphia, there is a chance that both races will be run.

Word has been received by the contest board that the proposed road race at Tacoma has been abandoned. The promoters found that the cost of importing eastern drivers, hanging up a \$5,000-purse and the comparatively small gate at a road race of the sort proposed, were three insuperable arguments against holding it.

HOPE FOR THE FAIRMOUNT

Philadelphia, Pa., May 24—Motorists and motoring enthusiasts are entertaining a hope that a way may be found to persuade the Fairmount park commissioners to reconsider their recent decision prohibiting automobile racing in the park. A resolu-

tion looking to the restoration of the annual 200-mile event was yesterday presented in common council by Frank L. Hardart and adopted.

In the meantime the Quaker City Motor Club is busy perfecting plans for the track meet to be conducted by the organization on Saturday, June 8, at Narberth and also has issued an appeal for 400 cars to transport children to Willow Grove park the following Wednesday on the occasion of the club's fifth orphans' day outing.

WEST WANTS VANDERBILT

Los Angeles, Cal., May 25—Owing to the success of the Santa Monica road races an organization has been formed among the leading men in the Pier avenue district to make an effort to secure the 1913 Vanderbilt cup race for Santa Monica. A committee, consisting of Paul D. Howse, A. W. Layne, C. E. Hile and Charles A. Brown, has been appointed to see what can be done toward getting the race. The organization is endeavoring to raise \$6,000 a month for the next 6 months to pay for a number of free attractions in the vicinity of the Fraser pier during the week the race is in progress. H. P. Schofield has been elected president of the organization.

GLIDDEN STARTS FROM DETROIT

Detroit, Mich., May 25—It was announced today by the Wolverine Automobile Club that this year's Glidden tour will start from this city and go to New Orleans, Chicago being on the route. The tour will be held in October. It also is reported that Dr. C. E. Dutton, president of the Minnesota State Automobile Association, has been offered the position of vice-chairman of the A. A. A. touring board, which would place him in direct charge of the Glidden.

FORAKER WINS SOCIABILITY

Washington, D. C., May 27—With seventy cars competing, Arthur Foraker, driving a Marmon, won the sociability run Saturday of the Automobile Club of Washington, covering the 22½-mile course in 1 hour 34 minutes 35 seconds, or 15 seconds more than the secret time set by District Commissioner Rudolph. It was the largest motor event of the season here.

Sanction has been granted the Automobile Club of Washington for a 3-day reliability tour through Maryland and Pennsylvania, June 11, 12 and 13.

TO RACE A TRAIN

Dallas, Texas, May 23—M. A. Sacksteder, Dallas manager for the Maxwell Automobile Co., has before him a task, which, if carried out successfully, will no doubt eclipse anything ever done in Texas in the way of motor trips. The plan is to leave Dallas Friday morning with the special train of delegates to the national meeting of Associated Advertising Clubs of America, in a Maxwell car, for Waco, 70 miles, and endeavor to reach the city ahead of the train. On arrival there he then will endeavor to beat the train to Houston.



Taking Chances

TO the amateur owner-driver the expression "taking chances" is clothed in more or less ambiguity. Only the person who has ridden in a car when chances have been taken is fully aware of what the expression means. "Taking chances" is driving a car at a rate of speed such that if an unforeseen exigency occurred the driver would not be able to control his machine and an accident or near-accident would result. There are hundreds of examples of chance taking. One of the most common, and almost daily and hourly occurrence in the country and also in cities, is approaching concealed road or street intersections at such a speed that should a motor vehicle, also taking chances, approach the same intersection on the other road at the same time it would be impossible for either driver to control his machine in time to avoid an accident. The country is full of concealed road intersections. Frequently a high hedge, a thick row of trees or a farm house entirely hides the view of the road intersecting at right angles. In such a case the driver should use his signal horn well in advance, he should slow up to such a speed that were there a car approaching on the other road it would be possible for both parties to stop their machines before a collision. To many drivers such precautions appear more or less ridiculous, but just such occurrences have caused many fatal accidents, and it is just such accidents that have caused the weaving of more stringent and often ridiculous legislation governing cars. And the end is not yet. With more of such accidents there will be more legislation, more fines, more delays on trips and more enmities created.

keeping close to the inside of the curve. The admonition for all occasions is: "Keep as close to the inside of the curve as you can when on the right-hand side of the road." Many a good driver if taking a curve at over 20 miles per hour will cut into the grass on the inside of the curve in order to prevent a skid or to keep the car from getting beyond the center line of the road. Curves are very deceptive and the fatal accidents occur on the apparently easiest curves. Such accidents have happened on curves of 135 degrees angle and others on curves of 150 degrees angle. The accidents were due to the driver keeping on the outer slope of the road when making the curve. The curves were invariably to the left, when it was the driver's duty to keep to that side of the road, but the fault lay in too much speed for such a position on the road. In many such accidents the danger was accentuated by throwing out the clutch when the speed was seen to be too great. While this apparently seemed right it was diametrically wrong, because with the clutch out the car was more or less like a ship without a rudder. With the clutch in and a moderate application of the brake it is possible to control the car through the engine instead of letting it roll to its own certain destruction.

APPROACHING bridges without slackening speed is a familiar example of "taking chances." It is a dangerous one, too. The most experienced driver when touring, has come to grief due to this cause. The reasons are many: Generally the road narrows when approaching a bridge and not infrequently there are a few rough spots within 5 or 10 feet of the entrance to the bridge. The car striking one of these hidden rough spots at speed will invariably bound to the side; if the driver is all-eyes to the occasion he may be quick enough with the wheel to avoid striking the railing of the bridge, but in nine cases out of ten the car will strike the side of the bridge with serious damage. The owner-driver is not the only guilty party in this work. In several of the tours within the last 3 years bad accidents have happened in nearly every run at bridge entrances. In one of the Glidden tours two cars crashed through the railings of high bridges when approaching them by a curve. In each case experienced road drivers were handling the cars and the accidents were due to hidden holes in the bridge approach that threw the car out of its course and the driver had not time to work the wheel and avoid striking the railing.

ONE of the most dangerous "taking chances" for the new driver is that of driving too rapidly over wet spots on a road. These are dangerous particularly if the road curves at the same spot. A skid will invariably result when the wheels on one side hit the soft place. The reason is simple: The motor is driving the car equally through the two back road wheels, due to the differential in the back axle. When one of the rear road wheels contacts with the soft spot, the adhesion between the tire and the wet surface is much less than that between the tire on the opposite wheel and the hard road; the wheel in the soft spot for the time being practically ceases to propel the car, at the same time all of the propulsion is taken up by the opposite wheel, tending to drive the car in a circle instead of in a straight line. The result is a skid, perhaps the car is ditched, it may be upset and a serious accident results. The due precaution is slowing down when approaching wet spots and chiefly so if the road surface is not a hard stone or macadam one.

MAKING road curves at too high speed is a dangerous chance. The history pages of motoring for the last 5 years record many fatal accidents due to this cause. In tours and in road races such have occurred and the private owner on his summer vacation has not been exempt. The toll has been very heavy, a whole family being practically exterminated in one accident of this nature in a high-powered machine. The danger in making the curve or corner at too high speed lies in the car getting over the middle of the road, or, in other words, not

EVERY motorist who passes horse-vehicles at speed on narrow roads is catering to the accident that comes from taking chances. This is especially true in country sections where women drive single-horse vehicles and where the horses are not all experienced with the car. The motorist should invariably have his car under perfect control at such times, so controlled that he can stop in 15 or 20 feet if necessary. Many cases are on record where the inexperienced horse has wheeled around in the road just as the car was passing; a two-horse team has been known to do this on many occasions and the end of the wagon tongue has swept the side of the car from front to rear, destroying the body and in a few cases striking the passengers on that side.

Targa Florio Captured by S. C. A. T. Car

PARIS, May 29—Special cablegram—The Targa-Florio, Sicily's classic road race which was run Sunday at a distance of 632 miles, was won by Scipe, an Englishman, driving a S. C. A. T. His time was 23:37:19. Garretto in a Lancia was second in 25:07:38. Gioradano in a Fiat was third in 25:41:04; Moraes in a Deutz fourth in 25:52:08; Lopez in a Fiat fifth in 26:57:37; Fracassi in a Ford sixth in 27:12:43; Olson Lancia, seventh, in 27:24:26; Trombetta, Fiat, eighth, in 29:45:20. An Overland car that started failed to finish. The two other Fords that were entered did not start. In the race a Mercedes driven by Nisa was overturned and the pilot was injured.

PARIS SALON DATES

Paris, May 11—Saturday, December 7, has been fixed as the opening day of the next Paris automobile show, and Sunday, the 22nd of the same month, as the closing day, the exhibition in the Grand palace thus remaining open to the public for 16 consecutive days.

This year's show is organized by the car manufacturers, 80 per cent of the profits being shared among the individual members taking part in the exhibition. Five trade associations—Automobile Syndicate, Cycle and Automobile Syndicate, Automobile and Accessories Syndicate, Bodymakers' Syndicate, and Accessory Manufacturers' Syndicate—are represented on a joint committee of which Armand Peugeot is the president and M. Cézanne the general secretary. The Automobile Club of France only figures in an honorary capacity, and really has no direct representative, for its only member, M. René de Knyff, represents the racing board and not the full club committee. When all expenses in connection with the salon have been settled, the profits will be distributed as follows: 40 per cent. to all exhibitors in proportion to the amount they have paid for the rental of their stands; 40 per cent to all exhibitors who for the previous 6 months have been attached to one of the five organizing syndicates; and 20 per cent into the funds of the five trade associations in proportion to the amount their members have paid in rental.

Motor show organizations in Paris always has been a profitable undertaking. When the Automobile Club of France held the first motor show in the world, in 1898, under a tent in the Tuileries Gardens, it realized a net profit of \$9,032. The following year the amount was a little larger, the third year it had increased still further, and the profits of the fourth show were about double those of the first. Altogether the first four shows of the club resulted in a net profit of \$59,999. In 1902 the French car manufacturers refused to allow the club to take all the profits of the annual shows. The national

Englishman Drives Winner of Sicilian Classic—Ford Finishes Sixth

club was allowed to continue the organization of the salon, but it had to admit on its committee a certain number of the three leading trade associations, and agree to share the profits with them. This arrangement was continued for 7 years—1902 to 1908—the individual profits for these seven shows being \$33,038, \$28,021, \$35,015, \$46,673, \$67,192, \$8,480, and \$28,080. The first eleven shows held in Paris—from 1898 to 1908—realized a total profit of \$296,495, of which the Automobile Club of France pocketed \$180,045, the Automobile Syndicate \$46,322; the Cycle and Automobile Syndicate \$46,116; and the Bicycle Syndicate \$24,012.

After the 1908 show there was another revolution. The manufacturers, declaring that the club was a social body kept up at their expense, refused to take part in

any more exhibitions organized by it. The joint committee, which had existed for 7 years, was dissolved; manufacturers declared that the profits should come back to the exhibitors and not be placed in the strong boxes of any trade association, and finally trade bodies which had not previously had a voice in the management of the exhibitions claimed a place on the committee.

The result was that the present joint committee, composed of members of the five leading trade associations, was formed and the profit-sharing scheme inaugurated, with only 20 per cent of the profits going into the funds of the trade associations. The prices of stands are high, for it is the policy of the organizing committee to cover all expenses without taking into consideration gate receipts; thus the 20 per cent retained for distribution among the five organizing associations is a considerable amount, and a number of members of the trade would see reform carried still further by lowering the rents and reducing the total amount to be distributed in profits. Despite criticism, however, the new arrangement of profit-sharing is much more equitable than the old system under which a social club, the members of which frequently had no trade connections, and sometimes did not even own motor cars, had the entire control and secured the whole of the profits.

Foreign firms wishing to take part in the next Paris show will be treated on the same basis as home manufacturers, the drawing of lots for positions being undertaken without any consideration of origin or importance of the firms. Applications for stands should be made to the secretary of the Chambre Syndicale des Constructeurs de l'Automobile, Avenue Alphonse, Paris.

FIXING NEW HAMPSHIRE ROADS

Concord, N. H., May 27—Reports from various parts of New Hampshire received at the state highway offices indicate that the roads throughout the state will be put in shape for travel earlier than ever this year. President E. Bertram Pike, of the White Mountain Board of Trade, has sent out word to many of the town officials throughout the mountain section asking them to start work early, and he has received replies from a number of selectmen in sections where hotels are located to the effect that they have already begun operations. Some of the roads are in good shape now, and by the middle of June it is expected that many more will be in first-class condition. Some of the roads around the lake section are in fair shape now, but there are occasional spots where washouts have occurred leaving bad holes. These can be fixed up quickly, however, and so the touring season in New Hampshire will begin much earlier than usual.

Coming Motor Events

May 30—Hill-climb; Automobile Club of Danbury; Danbury, Conn.
 *May 30—Indianapolis speedway, 500-mile race; Indianapolis, Ind.
 *May 30—Track meet, Rockingham park; Salem, N. H.
 May 30—Track meet, Washington, D. C.
 June 6—Reliability run; Washington Post.
 *June 8—Track meet; Quaker City Motor Club; Narbeth, Pa.
 *June 8-9—Hawthorne track meet; Chicago, Ill.
 June 15—Track meet; Belmont Motor Club; Narbeth, Pa.
 *June 20—Algonquin hill-climb, Chicago Motor Club; Algonquin, Ill.
 *June 20-22—Reliability run, Pine Tree Motor Contest Association; Portland, Me.
 June—Reliability run; Auto Club of St. Louis, St. Louis, Mo.
 June—Hill climb; Maine Automobile Association; Portland, Me.
 June 27-28—Interclub match, Chicago Athletic Association and Chicago Athletic Club.
 June—Track meet; Baltimore, Md.
 June 27-29—Summer meeting Society of Automobile Engineers; Detroit, Mich.
 July 4-5—Track meet; Taylor Automobile Club; Taylor, Tex.
 *July 4-6—Beach meet; Old Orchard Automobile Association; Old Orchard, Me.
 July—Reliability run; Maine Auto Association.
 July—Reliability run; Cleveland News.
 July 4—Track meet; Petersburg, Ind.
 July 5-6—Road Race; Montamara Festo Auto Com.; Tacoma, Wash.
 July 10-20—Canadian Industrial Exhibit; A. C. Emmett, manager motor section; Winnipeg, Can.
 July 15—Reliability run; Wisconsin State Automobile Association; Milwaukee, Wis.
 July 22-27—Cadillaqua celebration at Detroit, Mich.
 *August 8-10—Galveston beach meet; Galveston, Tex.
 *August 23-24—Road races; Chicago Motor Club; Elgin, Ill.
 *September 2—Speedway meet; Indianapolis, Ind.
 *September—Commercial vehicle run; Chicago Motor Club.
 September 17-20—Fire engineers' convention; International Association Fire Engineers; Denver, Colo.
 Sept. 23-Oct. 3—Rubber show, Grand Central palace, New York.
 Sept. 26-Oct. 6—Exposition agricultural motor cars; Bourges, France.

Hoosiers Thrilled by Speedway Trials

INDIANAPOLIS, Ind., May 26—Now that all but one of the steel mounts entered for the 500-mile grind on the speedway Memorial day are on the track for their preliminary workouts, the critics have a chance to see what the cars can do and how they are made. That the Indianapolis public, at least, is not uninterested is attested by the fact that each succeeding day sees the main grandstands more nearly packed with spectators, who have paid the 25 cents admission fee demanded at the gate for the tryouts.

Nor have grandstands been denied their excitement, for the practice during the last few days has afforded all the thrills of an actual race, in the way of fast times and narrow escapes. The best time clocked so far by the railbirds is Hughes' time on Friday, when he piloted his little Mercer for one lap in 1 minute 41 seconds, averaging a speed of 90 miles per hour for the 2½ miles around the brick oval. Ralph Mulford, in his Knox, has almost equaled this speed and Spencer Wishart, in the Mercedes, and Dawson, in the National, has been doing slightly better than 1:43 for the lap, or 87 miles per hour. A brush between Bruce-Brown in the Cutting and Ralph de Palma in the Mercedes furnished

Preparations for 500-Mile Race on Big Track Interests Fans at Indianapolis—Railbirds Watch Practice—Accidents Few but Spectacular—Incidents of the Training Camps



MULFORD AT THE WHEEL OF THE KNOX

the spectators of the practice a taste of actual racing, and according to the unofficial timers that lined the pits both averaged nearly 84 miles per hour for a few laps of the track.

Exciting Moments in Practice

Accidents so far have had the merit of being spectacular without resulting seriously. Just beyond the stands on Friday

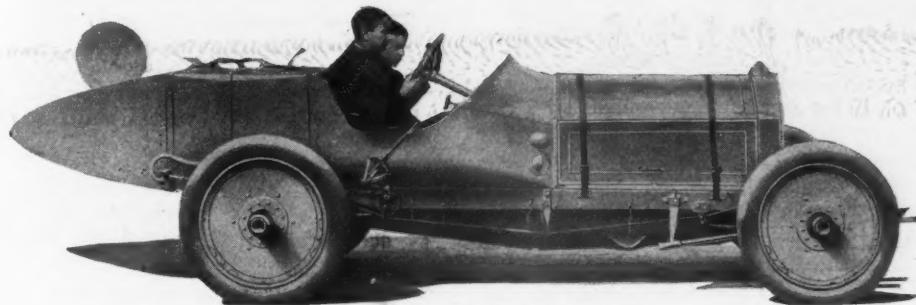
the six-cylinder White, driven by Jenkins, blew a tire and whirled twice around before the machine could be gotten under control. The masterly handling of the car prevented a dangerous spill. Ormsby's Opel, for the second time, caught fire during practice on Thursday, due, it is said, to the fact that both fuel and oil are fed to the motor by air pressure from the

NAMES OF THE CARS AND DRIVERS ENTERED IN THE 500-MILE INTERNATIONAL SWEEPSTAKES

No.	Car	Driver	Relief	No. of Cyl.	Bore Inches	Stroke Inches	Piston Displ. Cubic In.	H. P.	Tires	How Cast
1	Stutz	Anderson	Knipper	4	4 3/4	5 1/2	389.9	36	Michelin	Pairs
2	Stutz	Zengel	Knipper	4	4 3/4	5 1/2	389.9	36	Michelin	Pairs
3	Fiat	Tetzlaff	Bragg	4	5	7 1/2	589.0	40	Miller	Pairs
4	Mercedes	De Palma	Jeffkins	4	5 11/64	7 5/64	595.0	43	Michelin	Pairs
5	Case	Disbrow	.....	6	4 23/64	5	447.8	42	Palmer	Pairs
6	Case	Hearne	.....	6	4 23/64	5	447.8	42	Palmer	Pairs
7	Mercedes	Wishart	.....	4	5 1/8	7 5/64	590.0	42	Michelin	Pairs
8	National	Dawson	Herr	4	5	6 1/4	490.8	40	Michelin	Pairs
9	National	Wilcox	Rader	4	5	7 1/2	589.0	40	Michelin	Pairs
10	Lexington	Knight	Johnson	6	4 1/8	5 1/4	421.0	41	Michelin	Separate
12	Simplex	Dingley	Swanson	4	5 3/4	5 3/4	597.0	53	Michelin	Pairs
14	White	Jenkins	Fuller	6	4 1/4	5 3/4	489.0	43	Michelin	Block
15	Cutting	Burman	.....	4	5 7/32	7	597.9	43	Firestone	Pairs
16	Firestone-Col.	Frayer	Rickenbacher	4	5	5 1/2	432.0	40	Firestone	Pairs
17	Marquette-Buick	Liesaw	Farr	4	4 1/2	5	318.0	32	Michelin	Pairs
18	Schacht	Wm. Endicott	H. Endicott	4	4 3/4	5 1/2	389.9	36	Michelin	Pairs
19	Knox	Mulford	.....	6	4.8	5 1/2	597.0	55	Michelin	Pairs
21	Mercer	Hughes	Kitrell	4	4 3/8	5	300.0	31	Michelin	Pairs
22	Lozier	Moran	Ainslie	4	5 3/8	6	549.0	46	Michelin	Pairs
23	McFarlan	Marquette	Fowler	6	4 1/4	5	425.0	43	Michelin	Pairs
24	Opel	Ormsby	.....	4	4 1/2	6 7/8	437.0	32	Michelin	.....
25	Lozier	Matson	.....	4	5 3/8	6	544.0	46	Michelin	Pairs
26	Schampaugh	Shampaugh	.....	4	4 1/2	5	318.0	32	.....	.....
27	Continental	.....	.....	4	4 1/4	4 1/2	255.0	29	Michelin	Block
28	Stutz	Merz	Knipper	4	4 3/4	5 1/2	389.9	36	Michelin	Pairs
29	National	Bruce Brown	Herr	4	5	7 1/2	589.0	40	Michelin	Pairs
31	Mason	Oldfield	Kilpatrick	4	3 15/16	5	243.5	25	Michelin	Block

Mechanical Features of the Racing Cars

What Drivers Have Done to Get Top Speed Out of Their Mounts—Some Using Wire Wheels—Bodies Designed to Minimize Wind Resistance—Differentials Locked



BOB BURMAN IN THE BIG CUTTING

same source, requiring that the pressure on the gasoline be excessive to be sufficient for the oil. Whatever the cause, the flames spurted up over the footboard so that the clutch and brake pedals could not be used to stop the car and both driver and mechanic had to jump, allowing the car to smash into the fence. Neither driver nor mechanic was injured, and the damage sustained by the car is not sufficient to prevent its appearance on the day of the race.

The identity of the "mysterious un-

known" which has for the past two weeks been shrouded in secrecy has at last come to light. This is entered as the Shambaugh by Charles Shambaugh of La Fayette, Ind., and, it is whispered, consists of a Buick motor on a hybrid running gear. It has not appeared for practice as yet.

The withdrawal of Herrick today on account of wifely objections puts Eddie Hearne in as pilot of one of the Case cars, while Disbrow, the head of the Case team, will drive the other entry. Both of the

Case whalebacks, whose mammoth rearward extensions have made them the most sensational looking machines seen on a track, have been shorn of all extra appendages in the effort to reduce weight so that when they next appear the cars will rival the Mercedes for squat appearance. Something over 1,000 pounds in excess weight has been eliminated from each car, but they lose the effect of the streamline body of the original design.

Wire Wheels an Issue

One of the most important questions to be decided by the race on Thursday is the effect of wire wheels. These wheels will have their first real test in America on that day, and the way they and the tires on them stand up in the 500-mile grind will, it is believed, greatly affect their use in this country. The opportunities for a comparison of wire and wood-spokes that will be offered are excellent, for the wire wheels will be used on both light and heavy cars in the race. Among those cars which are fitted with the wire wheels are the Hughes Mercer, the two Case cars, the Firestone-Columbus and the Opel. The first three are employing the English Rudge-Whitworth demountables and the Firestone-Columbus carries McCue wire demountable wheels of American

RACE WITH DIMENSIONS AND DESIGN OF MOTORS AND FEATURES OF ACCESSORY EQUIPMENT

Valves		Gear Ratio	Magneto	Carburetor	Wheel Base	Shock Absorber	Features
Location	Diameter — inches						
Opposite	2 3/8	7/16	2.19:1	Splitdorf	110	Hartford	Double Distributer
Opposite	2 3/8	7/16	2.19:1	Splitdorf	110	Hartford	Double Distributer
Head	2 1/4	7/16	2.2:1	Bosch	107	Hartford	
Head	{ In. 3 3/8 Ex. 2 (d'ble)	7/16	1 7/8:1	Bosch	108	Mercedes	Chain Drive
Side							Rudge-Whit. wire wheels
Side	{ In. 3 Ex. 2	7/16	2:1	Remy	123	Hartford	
Side							Rudge-Whit. wire wheels
Head	{ In. 3 3/8 Ex. 2 (d'ble)	7/16	1 5/8:1	Bosch	108	Mercedes	Chain Drive
Side & Head							.....
Side & Head	2 3/4	13/32	2:1	Splitdorf	110	Hartford	
Side	3	7/16	2.13:1	Bosch (2)	112	Hartford	4 Spark Plugs in Each Cyl.
Opposite	2 1/8	3/8	2:1	Remy	118	Hartford	Rear Wheels Sheet Steel
Side	1 5/8	5/16	2.2:1	Mea	114	Hartford	Chain Drive
Opposite	2 13/16	9/16	1.75:1	Remy	115	Hartford	.....
Side	2 1/2	9/32	2:1	Remy	110	Hartford	Sheet Steel Rear Wheels
Head	{ In. 1 11/16 Ex. 1 5/8	7/16	2.5:7	Remy	112	Hartford	McCue Wire Wheels
Opposite							.....
Head	2 1/2	3/8	2.25:1	Splitdorf	110	Hartford	.....
Opposite	1 3/4	3/8	2:1	Bosch	114	Mondex	Sheet Metal Wheels
Opposite	2 1/4	7/16	2.5:7	Bosch	108	Hartford	Rudge-Whit. wire wheels
Head	2	3/8	2.03:1	.....	124	.....	.....
Head	2	7/8	2.5:1	Splitdorf	115	Hartford	.....
Head	.....	.....	.....	Bosch	Rayfield	Rayfield	.....
Side	2 1/4	7/16	2.3:1	Remy	116	Hartford	.....
Opposite	2 3/8	7/16	2.19:1	Splitdorf	110	Hartford	Double Distributer
Side & Head	3	7/16	2:1	Bosch (2)	112	Hartford	4 Spark Plugs in Each Cyl.
Head	1 15/16	5/16	2.6:1	Splitdorf	104	Hartford	.....



HEARNE IN THE CASE WHALEBACK BEFORE REMODELLING

manufacture. The Opel wheels are not demountable.

That the use of wire wheels will materially increase the running time of the cars so fitted is the belief of many about the camps. The adherents of this type of wheel hold that greater mileage can be obtained from the tires on wire wheels, Hughes figuring on a 40 per cent increase in life over those on wood wheels. This is credited to two causes, first, that the metal spokes conduct the heat away from the tires more rapidly and, second, that the greater resilience of the metal spokes will decrease the actual wear on the treads. The fact that the wheels are demountable is believed to make tire changes quicker, an entire wheel being changed instead of the rim alone. Less danger is apprehended as well of broken wheels from skidding, in fact, Nikrent lays his escape from a dangerous accident Thursday to the wire wheels. The Case car skidded clear into the grass when taking a turn at what the driver says was a speed of 80 miles an hour at the point where Greiner turned over in last year's race. The flexibility of the wire wheels is credited with preventing a similar mishap to Nikrent and his mechanic.

Sheet Metal Guards

Several of the cars have the wooden spokes covered with sheet metal disks to reduce the air resistance. These were at first put on all four wheels but most of the drivers found that the shields on the front made the car hard to steer, and it is probable that nearly all will appear with the guards on the rear wheels only. Among those so equipped are the Schacht, White, Cutting, Knox and Lexington.

A feature of the construction of the cars this year is the prevalence of the stream-line body with the narrow radiator and tapering tail to reduce air resistance. This design was one of the distinguishing points of Harroun's Marmon that won last year's race. The little Mercer, the Cutting, the McFarlan, and the Schacht will have this type of body while the two Case cars have removed this feature in favor of lightness. Hughes has his Mercer fitted with a smooth pan that encloses the entire bottom of the body, believing that a smooth surface is as necessary below as anywhere else.

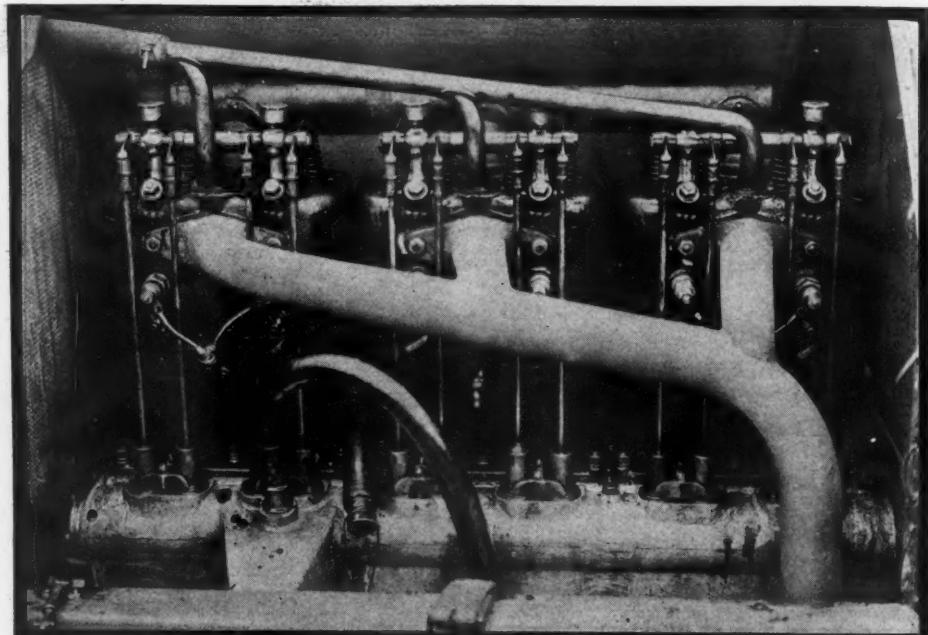
Locking the differential gears for the race is a subject of much discussion about

the camps. It is held by those who favor the move that it results in a distinct saving in tires owing to the fact that with the differential in operation, the driving wheel that is off the track—as one of them is most a good part of the time—gets to revolving at a very high rate of

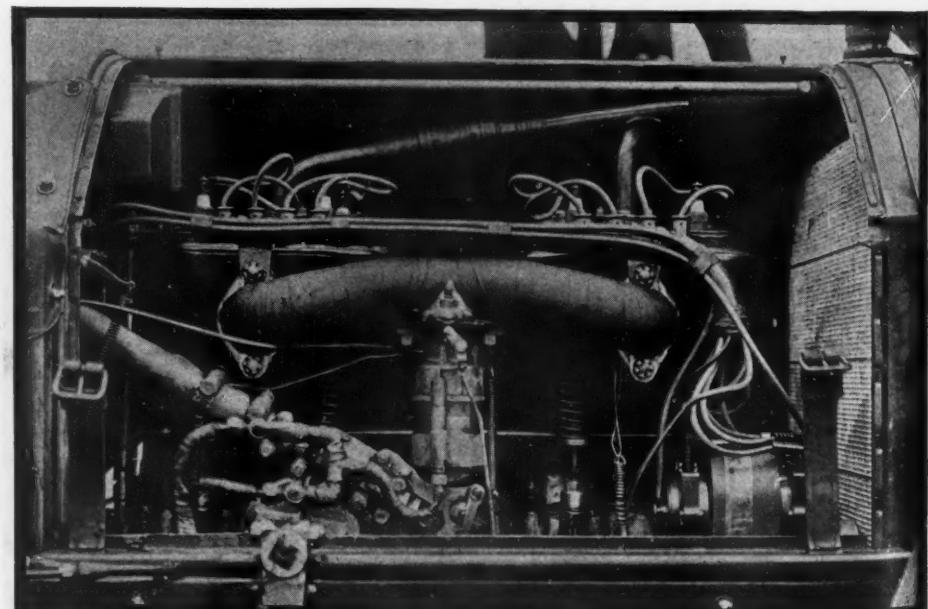
speed. When it comes back to the ground the friction on the pavement wears off the tread very rapidly and causes excessive heat. At the same time, it is claimed; the wheel on the ground which is actually supplying traction is turning at a slower rate than it otherwise would, owing to the differential action. Those who believe in retaining the differential say that there is as much wear on the tire due to sliding around the curves without the differential action as is gained in other ways. Some racers without the differential action are the White, the two Cases, and the Firestone-Columbus.

Gear Ratios in Question

The question of gear ratios is beginning to interest motorists more than ever before and the gear ratios used by the different racing cars offer an idea as to what the driver thinks the proper ratio for



EXHAUST SIDE OF MCFARLAN SIX VALVE-IN-THE-HEAD MOTOR



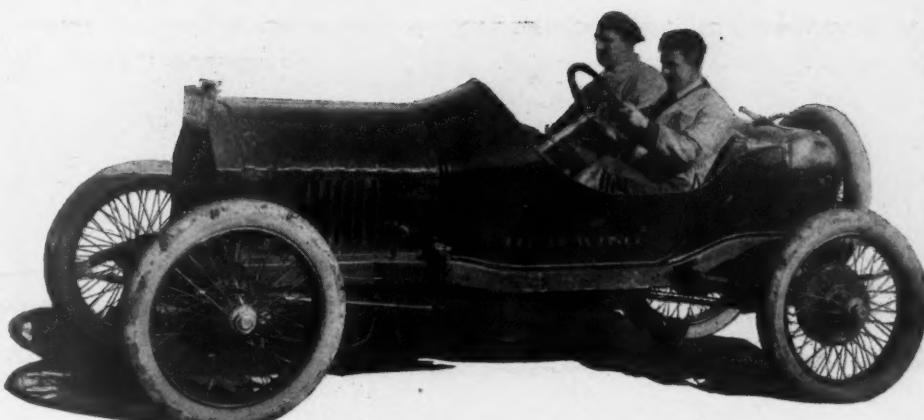
INTAKE SIDE OF SIMPLEX SHOWING HOW FUEL LINE AND MANIFOLD IS TAPE

speed work should be. A consultation of the gear ratios in the table will show that the average is between 2 and 2.2 to 1. The smallest gear ratio is that used by Wishart on the No. 7 Mercedes. This is 1½ to 1. The largest gear ratio given is one the Marquette Buick No. 17. This is 2½ to 1.

Special Ignition

It will be noticed that particular care is taken that the ignition can be relied upon. Two-point ignition is obtained in the majority of the cars by means of a double distributor. In two cases, that is in the two Nationals, driven by Wilcox and Bruce-Brown, two separate magnetos are employed, each having two-point ignition so that there are four spark plugs in each cylinder.

Special arrangements are also made that the intake and exhaust gas be given ample



LEE FRAYER IN THE FIRESTONE-COLUMBUS RED WING

passage into and out of the cylinder. For instance, in Tetzlaff's Fiat there are two exhaust valves and two inlet valves in each cylinder, making sixteen valves in the

four-cylinder motor. In Wishart's Mercedes there are two exhaust valves in each cylinder. In the Lexington six-cylinder two carburetors are employed, one at each end of a long-straight manifold.

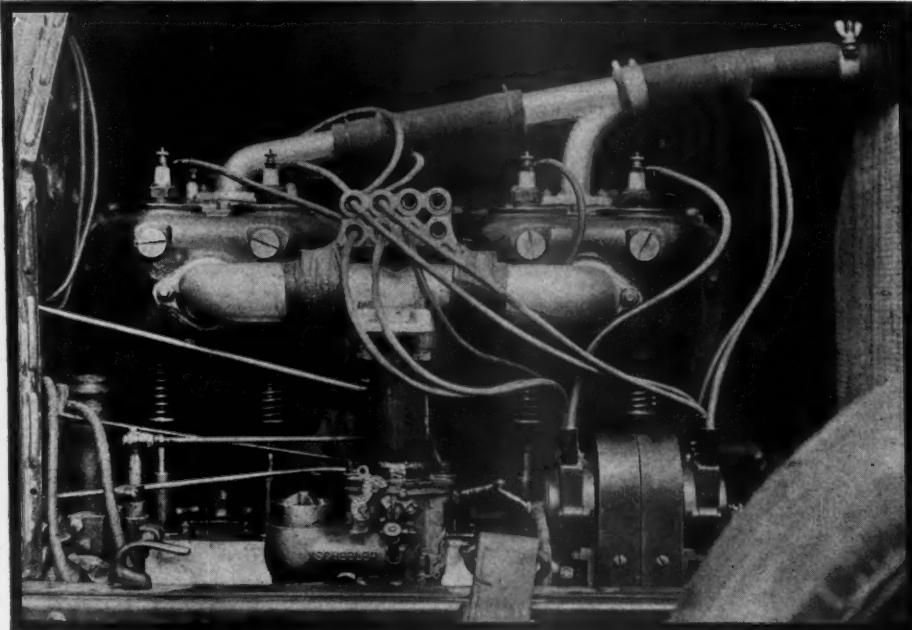
In two cases at least the pistons have been lightened by drilling holes in the piston walls so that there is less friction on the cylinder, less weight in the reciprocating parts and less whipping at high speed. Two of the cars in which the pistons are treated in this manner are the Mason, and the McFarlan.

The Cars in Detail

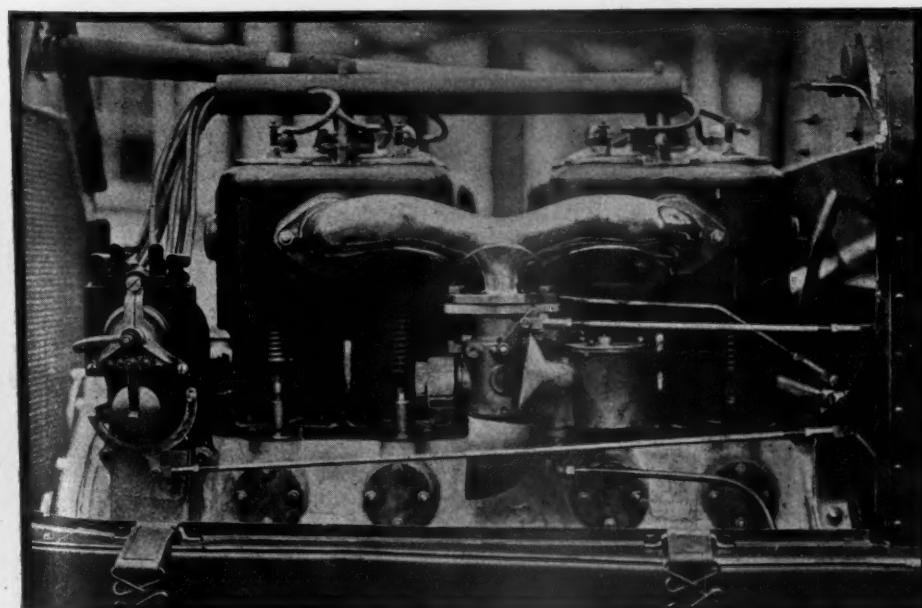
Most interest attaches perhaps to the Hughes' Mercer, as it is the newest racer at the camp and embodies many novel features. The motor with its 4½-inch bore and 5-inch stroke comes just under the 300-inch classification as to piston displacement and will compete with motors up to double its size. One of the new things about the new Mercer racer is the transverse shaft in front of the forward cylinder for the magneto and pump. This is driven by silent chain and worm gear from the crankshaft. Ball-bearing cam-shafts are used with hollow pushrods. The motor is of the T-head type and the valves are 2½ inches in diameter with $\frac{1}{16}$ -inch lift.

Another car in which considerable interest has been aroused is the Cutting entry, driven by Bob Burman. The car differs from ordinary Cutting design in that it is larger in every way, the piston displacement coming barely within the 600-cubic inch limit. The cylinders of this motor are cast in pairs and are of the T-head type. The valves are 2 13/16 inches in diameter and have a lift of $\frac{1}{8}$ inches; a little greater than the usual practice in racing, which is $\frac{1}{16}$ inches. The wheelbase is 115 inches and the gear ratio is very low, only 1.75 to 1. This car has the rounded hood and conical tail to give it the stream-line body.

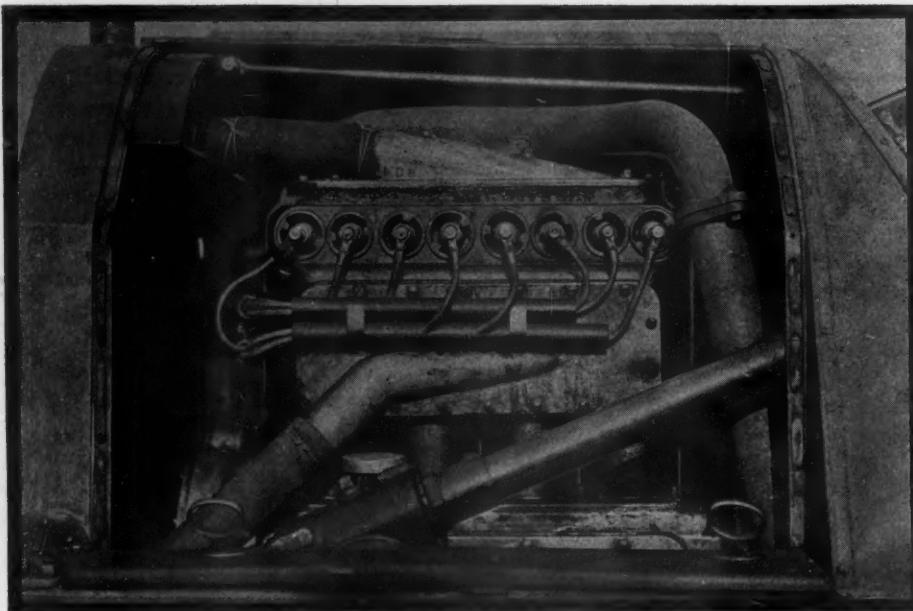
The Case cars are both examples of how many slight changes may be made to increase the speed of a car for a long race such as this. Although the motor construction itself is not out of the ordinary the arrangement of the body and ignition and some other features are special constructions. The six cylinders of the motor



SCHACHT MOTOR WITH DOUBLE DISTRIBUTER MAGNETO AND HIGH-TENSION INSULATOR



HUGHES' MERCER WITH TRANSVERSE MAGNETO AND PUMP SHAFT



BLOCK MOTOR OF THE MASON SHOWING SPARK PLUGS IN SIDE

are cast in pairs and have a bore of 4 23/64 inches by 5 inches stroke. The valves are on one side and have a lift of $\frac{1}{8}$ inch, the intake valves are 3 inches in diameter and the exhaust 2 inches in diameter. The wheelbase is 123 inches and the gear ratio, while not definitely decided, will be probably 2 to 1 on Disbrow's car, and 2 1/2 to 1 on the Hearne car.

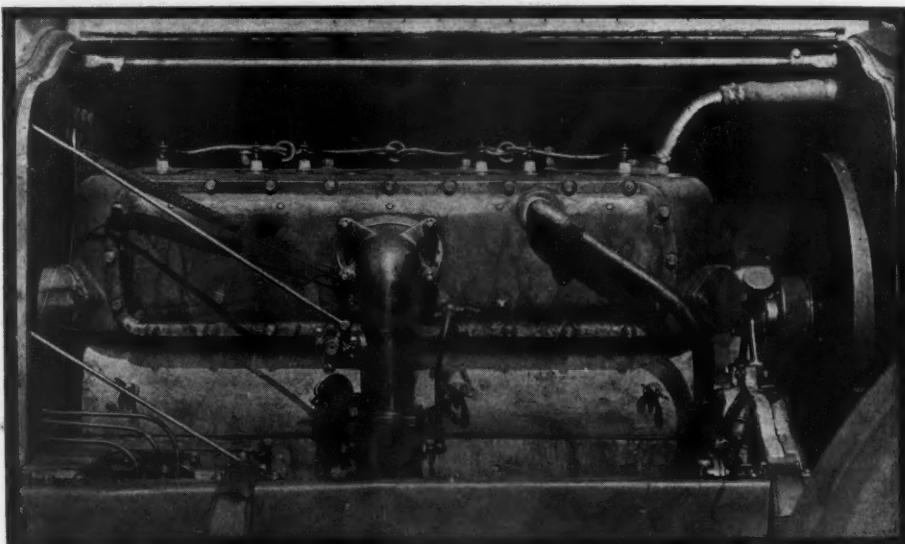
The extraordinary body design, which was tried out in preliminary practice and discontinued, has been described already. Some of the other notable features are the use of the Rudge-Whitworth demountable wire wheels with Palmer cord tires; the screen of conical-shape in front of the radiator; and the mounting of the dash switch and coil for the double distributor magneto on the frame of the car alongside the magneto, the switch being operated from the dash by means of a rod. The object of placing the coil and switch in this position is to reduce the length of the wiring and so reduce the chances of short-circuits and leakage of current. In place of the speedometer used in the Case there is installed on these cars Hopkin's electric tachometers, by which the speed of revolution of the engine is shown rather than the actual speed of the car.

Three Stutz Alike

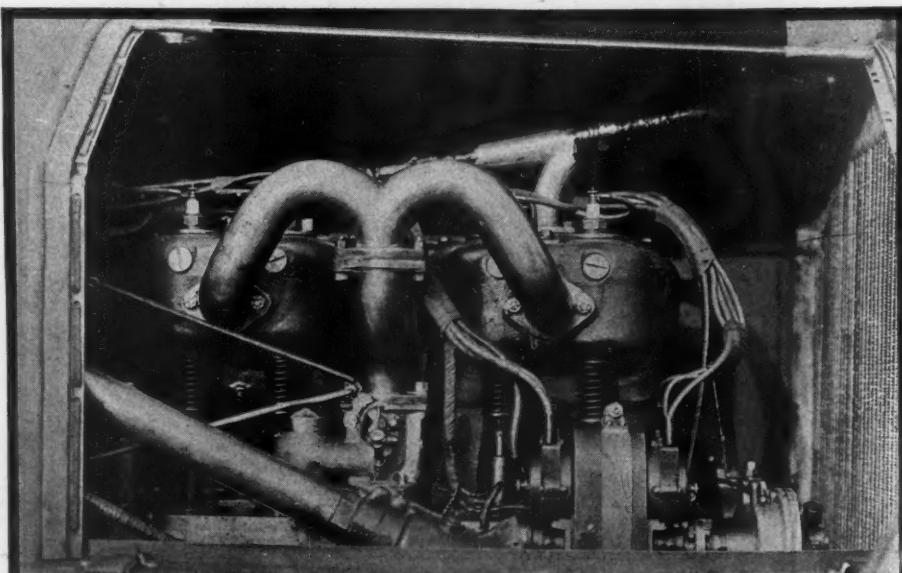
The three Stutz cars are alike in practically every respect. The four cylinders are 4 1/4 inches in diameter, with a 5 1/4-inch stroke, making their displacement 389.9 cubic inches. The cylinders are cast in pairs and are of the T-type. The inlet valves are driven from a camshaft on one side of the motor which gives the valves a lift of $\frac{1}{8}$ inches. The exhaust cams are on the opposite side and have a lift of $\frac{1}{2}$ inch. All valves are 2 1/2 inches in diameter and a double distributor magneto is used. The wheelbase is 110 inches and a gear ratio of 2 1/2 to 1 is employed in the rear axle.

Of the three National cars the mounts of Wilcox and Bruce-Brown are alike. The motors have four cylinders 5 by 7.5 inches, with a displacement of 589 cubic inches. These motors have as great a stroke-bore ratio as any cars in the race, 1.5 to 1. The cylinders are cast in pairs and the intake valves are located in the head and the exhaust valves on the side. Both are 3 inches in diameter and have a lift of $\frac{1}{8}$ inch. The feature of both these cars is the ignition in which two magnetos are employed, each of which supply a distinct two-point system, so that there are four spark plugs in each cylinder. The other National, driven by Dawson, is practically the same except that the stroke is 6 1/4 inches, and the valves are 2 3/4 inches in size with 13/32-inch lift. The type of motor is T-head. There is a 2 to 1 gear ratio in the rear system.

The Continental is one of the three motors in which the cylinders are cast in one



JENKIN'S WHITE HAS SIX-CYLINDER BLOCK MOTOR, EXCEPT FOR ADVANCING THE VALVE TIMING, IT IS SAID THAT THIS MOTOR IS STANDARD IN EVERY RESPECT



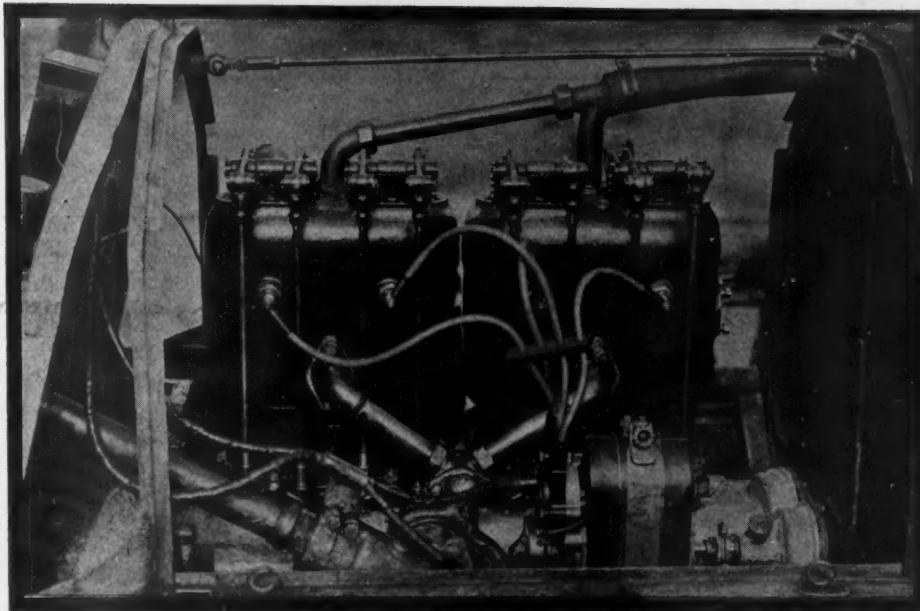
INTAKE SIDE OF THE STUTZ CARS WITH RAM'S-HORN INLET MANIFOLD

block. The motor is the next to the smallest entered in the race, its four cylinders having only $4\frac{1}{4}$ -inch bore and $4\frac{1}{2}$ -inch stroke, giving it a displacement of much less than half that of many of the entries. In this motor the valves are located on one side and are $2\frac{1}{4}$ inches in diameter, with $\frac{7}{16}$ -inch lift. The wheelbase of the car is 115 inches and the gear ratio is $2\frac{1}{8}$ to 1.

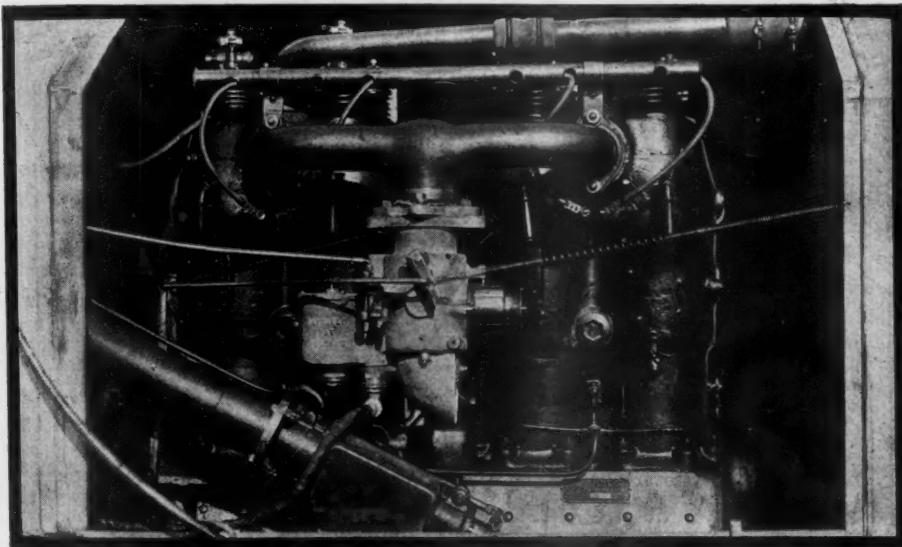
Red Bird Has Wire Wheels

Lee Frayer's car, the Firestone-Columbus, is unique in one respect and that is the use of American wire wheels. Aside from this it is the same car that appeared on this track last year. It has a 5-inch bore with a $5\frac{1}{2}$ -inch stroke, with the cylinders cast in pairs and the valves on one side with the intake valve directly over the exhaust. The diameter of the valves is $2\frac{1}{2}$ inches and the cams arranged to lift $9/32$ -inch. Two to 1 gear ratio is used and the differential is locked.

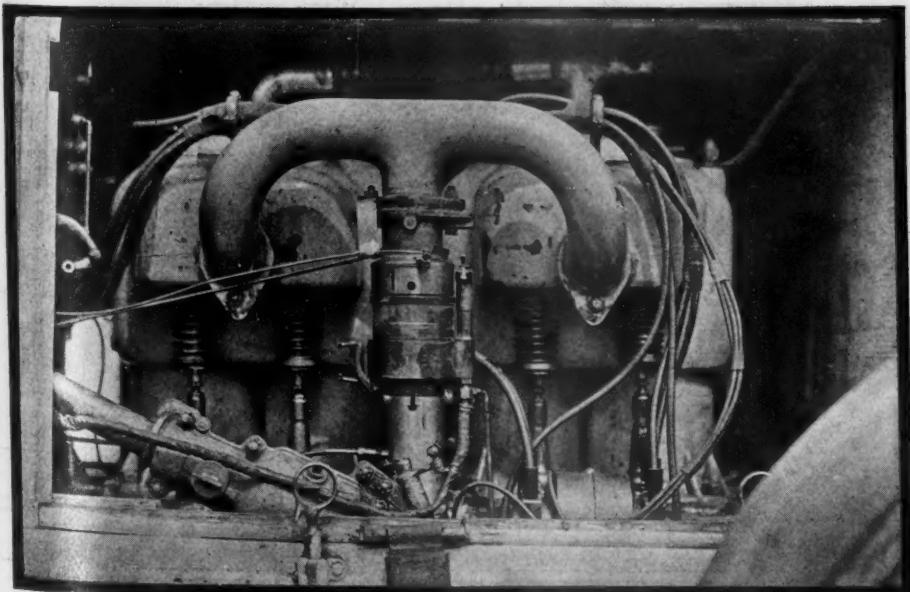
The Schacht is one of the smaller cars,



UNDER THE BONNET OF THE MARQUETTE-BUICK



INTAKE SIDE OF DE PALMA'S MERCEDES



HORAN'S LOZIER MOTOR FROM THE CARBURETER SIDE

having a displacement of less than 390 inches, the same as the three Stutz cars. Its four cylinders are cast in pairs with valves on opposite sides. Both intake and exhaust valves are $2\frac{1}{2}$ inches in diameter and lift $\frac{3}{8}$ -inch off their seat. A comparatively short wheelbase of 110 inches is employed and the wooden spokes of the wheels are covered with sheet metal disks to minimize wind resistance.

Two of the Big Ones

Bert Dingley's Simplex is familiar to those who have watched previous races. The chief feature of the car is the use of double-chain drive as final drive. Its four cylinders are $5\frac{3}{4}$ inches square, giving it a displacement of just under the 600 cubic inches limit. The cylinders are cast in pairs and are of the T type.

Another of the big cars is the Fiat, which is to be piloted by Tetzlaff, the road race record holder. The motor has four cylinders of 5 inches bore and $7\frac{1}{2}$ inches stroke, giving a piston displacement of 589 cubic inches. This car, like the Simplex, uses double-chain drive with a gear ratio of approximately $2\frac{1}{4}$ to 1. Each cylinder has four valves, there being two sets of exhaust valves and two sets of inlet valves, making sixteen valves in all. Each valve is $2\frac{1}{4}$ inches in diameter with a lift of approximately $\frac{1}{4}$ -inch.

The chief feature of the Lexington is the fact that two carburetors are used to supply a single inlet manifold to the six cylinders. A carburetor is placed at each end of the manifold which is a straight pipe with three branches which again branch to each pair of cylinders. By this arrangement it is believed that the loss of power due to wire drawing and condensation will be minimized. The cylinders are $4\frac{1}{8}$ by $5\frac{1}{4}$ inches and are cast separately. Both intake and exhaust valves are located on the exhaust side and both are $2\frac{1}{2}$ inches in diameter with $\frac{3}{8}$ -inch lift. A gear ratio of $2\frac{1}{2}$ to 1 is used.



THE LITTLE MASON, SMALLEST CAR ENTERED

Another six-cylinder car is the McFarlan. This motor is $4\frac{1}{4}$ by 5 inches in size and is practically the same piston displacement as the Lexington. The cylinders in this motor are cast in pairs with both valves located in the head of the cylinders, and both are 2 inches in size with $\frac{3}{8}$ -inch lift. A gear ratio of $2\frac{1}{2}$ to 1 is used in the rear axle system.

White's First Appearance

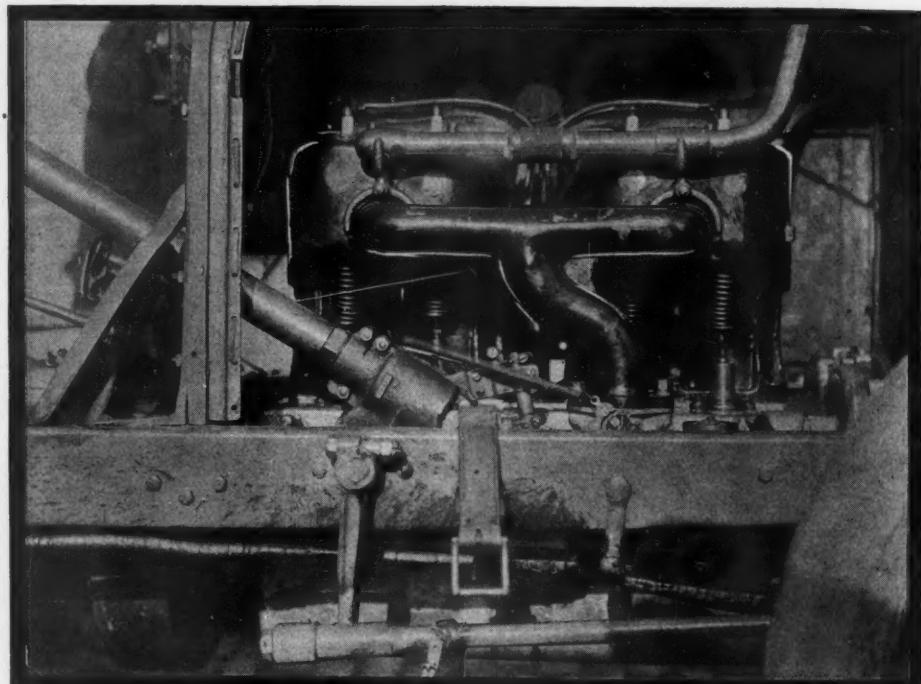
A car making its first appearance upon the Indianapolis track is the White six driven by Jenkins. So far as can be ascertained from an examination of the car the only changes from the standard White six motor is in the valve timing, which has been arranged for higher speed. In the running gear the changes include locking differential, putting sheet metal guards over the spokes of the rear wheels, and putting a wooden filler of triangular section in front of the I-beam front axle to reduce wind resistance. The motor seems to be standard in most respects. All six cylinders are made in a single casting with the intake and exhaust manifold an integral part of the casting. The dimensions of the cylinders are $4\frac{1}{4}$ by $5\frac{3}{8}$. The valves are located on the same side of the motor and are $1\frac{1}{8}$ inches in diameter with $\frac{1}{8}$ -inch lift. The gear ratio is 2.2 to 1. A peculiarity that will be noticed is that the driver is on the left side of the car.

A car that will be recognized as an old-timer on the track is the Marquette-Buick which will be driven by Liesaw. This car is one of the original Marquette-Buicks with a four-cylinder motor, $4\frac{1}{2}$ by 5 inches in size. The cylinders are cast in pairs with both valves in the head, the intake valve being $1\frac{1}{2}$ inches in diameter and the exhaust valve $1\frac{1}{8}$ inches in diameter. The usual lift of $\frac{1}{8}$ -inch is given the cam contour and the conservative ratio of $2\frac{1}{2}$ to 1 employed for the race.

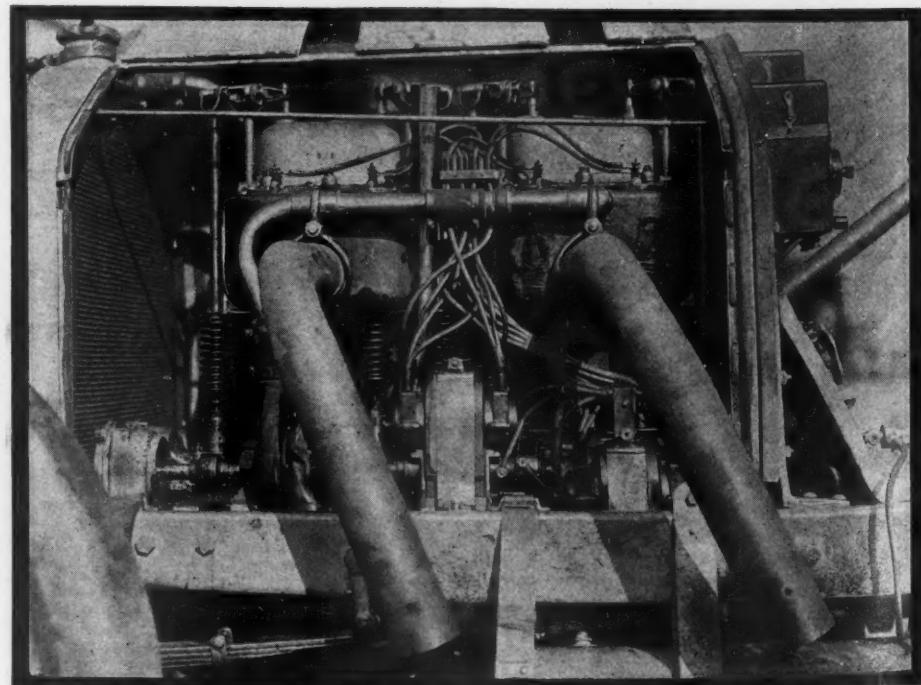
The two Loziers are practically the same, and a description of one will do for both. The car has a four-cylinder motor of $5\frac{3}{8}$ bore and 6 inches stroke, giving it a piston displacement of 544 cubic inches. The cylinders are cast in pairs with the valves located overhead. They are 2 inches in diameter and $\frac{3}{8}$ -inch lift. Two-point ignition is employed. The gear ratio

is slightly greater than 2 to 1; the wheel-base is 124 inches.

Two old-timers that will show on the track again this year are the Mercedes cars, one driven by Ralph de Palma, and the other by Wishart. These cars were among the first really long-stroke motors. Wishart's car is $5\frac{1}{4}$ inches in bore with a stroke of $7\frac{5}{64}$ inches, giving it a bore-stroke ratio of 1.4 to 1. DePalma's car is slightly greater bore, 5.186 inches, except for the gear ratio the cars are in every respect the same. The four cylinders are cast in pairs with the valves in the head, the inlet valves are $3\frac{3}{8}$ inches in diameter. Double exhaust valves are used in each cylinder and these are 2 inches in



INTAKE SIDE OF DAWSON'S NATIONAL

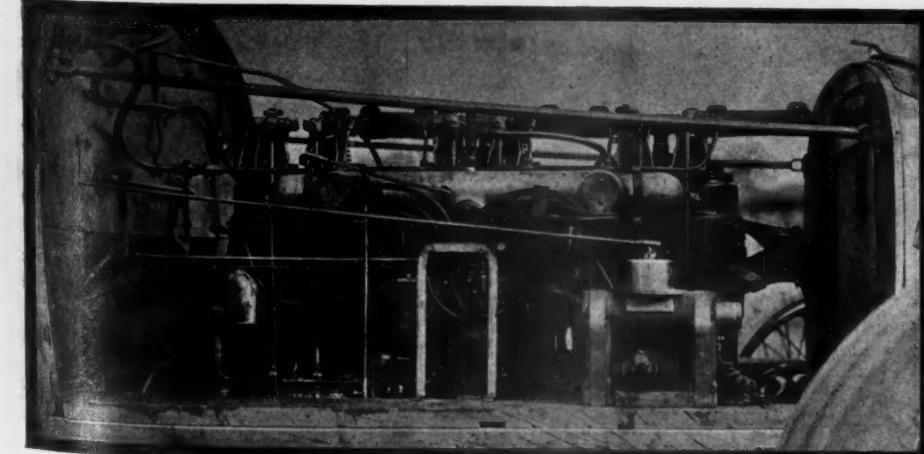
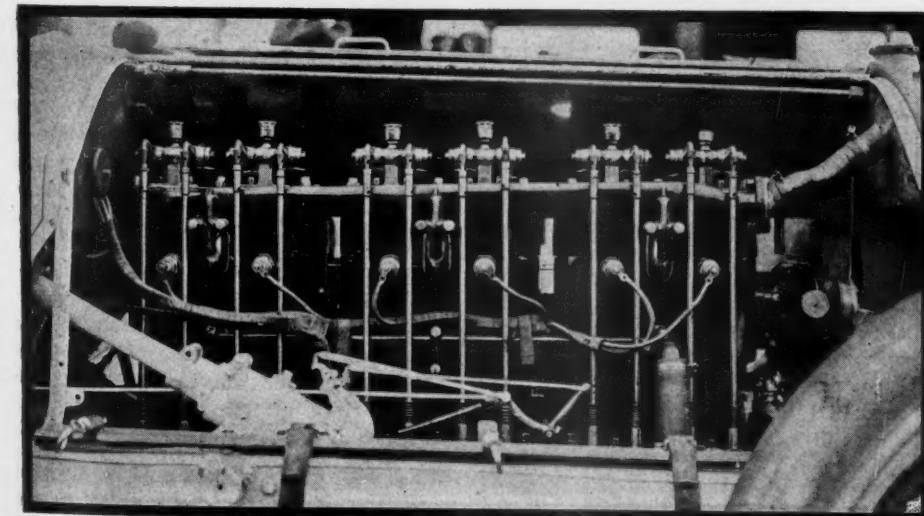
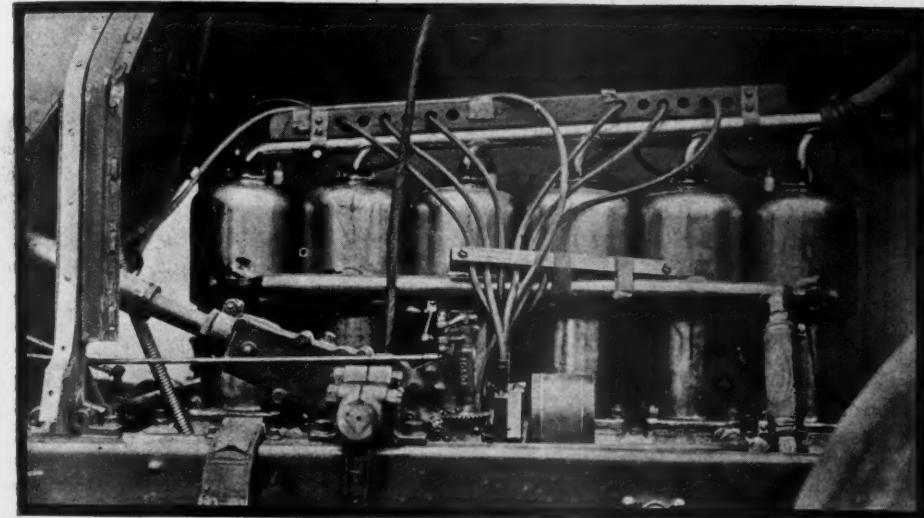
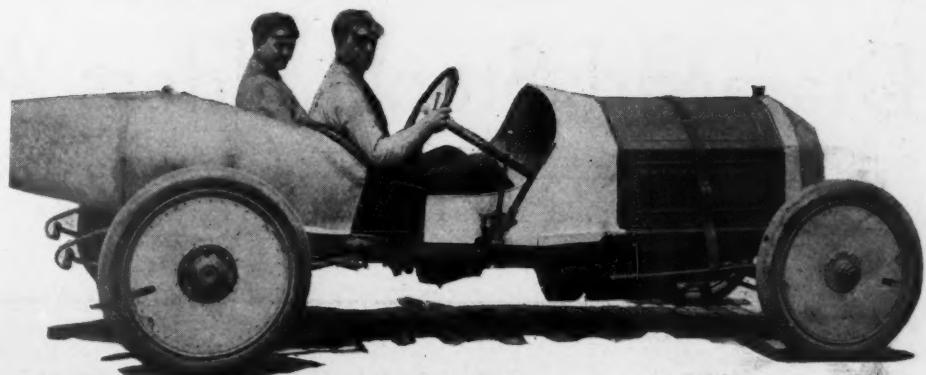


EXHAUST SIDE OF BRUCE-BROWN'S NATIONAL

diameter, and the lift is approximately $\frac{7}{16}$ inch in diameter. Drive to the rear wheels is by double chain. The cars have a comparatively short wheel-base of 108 inches, which gives them a rather sawed-off appearance. In DePalma's car the gear ratio is $1\frac{1}{8}$ to 1, and in Wishart's car the gear ratio is $1\frac{1}{8}$ to 1.

Smallest Entry

The smallest car in the race is the little Mason, which will be driven by Lee Oldfield. This car has four cylinders of $3\frac{1}{8}$ inches by 5 inches, bore and stroke, giving



it a piston displacement of only 243.5 cubic inches. The motor is a monobloc casting with valves located in the head. These are $1\frac{1}{8}$ inches in diameter, with a lift of $\frac{1}{8}$ inch. The pistons have been lightened by boring the walls full of holes. Two-point ignition is supplied by the magneto so that there are eight spark plugs in all. The gear ratio is 2.6 to 1.

Mulford's Knox

A car that comes very close to the limit of piston displacement is the Knox, driven by Ralph Mulford. This has a six-cylinder motor of 4.8 inches bore and $5\frac{1}{2}$ inches stroke, giving it a piston displacement of 597 cubic inches. The wheels are of the regular wooden type with sheet metal wind guard over the spokes. The cylinders in this motor are cast separately with the valves overhead operated by long pushrods and rocker arms. These valves are $1\frac{1}{4}$ inches in diameter with $\frac{3}{8}$ -inch lift. The car has a 2 to 1 gear ratio.

Another foreign car is the Opel, with a four-cylinder motor of $4\frac{1}{2}$ -inch bore and $6\frac{1}{8}$ -inch stroke. The cylinders are cast in pairs with the valves overhead. The exhaust valves are $1\frac{1}{2}$ inches in diameter and there are two of these in each cylinder. They have a lift of $\frac{1}{4}$ -inch. The intake valves are $3\frac{1}{2}$ inches in diameter. A double distributor magneto is employed. The wheelbase is 128 inches with a gear ratio of 2 to 1. This car uses wire wheels and is the only one using wire wheels in which the wheels are not demountable. A peculiarity of the gasoline and oil feed in this motor is that both are maintained under pressure of air from the same source, so that both oil and fuel are carried under the same pressure. This requires a pressure on the gasoline to nearly the limit of safety in order to maintain pressure for lubrication.

Weather a Strong Factor

The condition of the weather will be a strong factor in the results to be obtained in Thursday's race. If the weather is hot the total average speed will be cut down considerably because of the many tire changes that will ensue. If the weather is cool so that there will be less burning up of tires, a high average speed should be maintained.

- 1—Endicott and Anderson in Schacht.
- 2—Lexington Wiring Features.
- 3—Right Side of Knox Six.
- 4—Location of Switch in Cases.

Diamond Stockholders Approve Deal

Sale to Goodrich Company Officially Ratified and All That Remains Is the Formal Transfer—Rumor There Will Be Rate War with United States Tire Co.

AKRON, O., May 27—Stockholders of the Diamond Rubber Co. this afternoon unanimously ratified the action of the directors in the sale of the plant to the B. F. Goodrich Co. All that remains is formal transfer. One of the rumors of the day was that there is to be a rate war between the Goodrich company and the United States Tire Co. It was claimed today that the new Goodrich-Diamond company will be on one side and representing the two greatest of combined independent interests. The United States Tire Co., a \$75,000,000 consolidation of the Morgan & Wright, the Continental, the Hartford and the G & J tire companies, on the other.

The first big cut of 25 per cent on tires was made by the Goodrich company shortly after the Diamond was taken over by the Goodrich. H. S. Firestone, president of the Firestone Tire and Rubber Co., said today that the rate war will not come for a year. Firestone added that he is not alarmed. Frank A. Seiberling, president of the Goodyear Tire and Rubber Co., just home from Europe, said that he knows nothing of the rumored rate-slashing. "There is absolutely nothing to the rumor," said Seiberling, "that the Goodyear and other independent companies might get together as did the Goodrich and Diamond." Firestone also denied that there is any possibility of his company going into a combine with any of the other tire companies. "No price could be offered that would induce me to sell out or consolidate," said Firestone.

In the meantime the city is full of rumors and other big doings in the rubber world would cause no great surprise.

CRUDE RUBBER MARKET

New York, May 28—Crude rubber sagged slightly during the week on tame trading, which was small in volume throughout the rubber markets of the world. Holders of stocks are said to have been responsible for the report that the supplies in hands of consumers was steadily diminishing, but the report did not have any tendency toward giving strength to the market. As a matter of fact the consumers are showing a marked disposition to leave the market alone, as if their warehouses were filled with crude. The price basis was \$1.09 $\frac{1}{2}$ a pound for fine up-river.

According to a statement sent out by Samuel P. Colt, president of the United States Rubber Co., the common dividends for the year amounted to \$4,550,000 and the surplus of the company was increased by about \$2,000,000. On April 1 the surplus of the company was \$9,175,729, including that of the direct subsidiaries. On

January 1 the Rubber Goods Mfg. Co., of which the United States Rubber Co. owned practically all the common stock and over 75 per cent of the preferred issues, had a surplus of \$8,260,877 to its credit.

REO DECLARES DIVIDEND

Lansing, Mich., May 27—The Reo Motor Car Co. has declared a 10 per cent dividend. The dividend is the first to be declared since June, 1910. The capital stock of the company is \$2,000,000. In August, 1909, the company paid a 20 per cent dividend. In June, 1910, a 30 per cent dividend was paid. The Reo Motor Truck Co., which is largely owned by stockholders of the Reo Motor Car Co., paid a 30 per cent dividend to its stockholders last fall.

PHILP JOINS STUDEBAKER

Detroit, Mich., May 27—Arthur I. Philp, central district manager of the United States Tire Co., has joined the Studebaker forces, automobile division, in the capacity of assistant to Sales Manager Ernest R. Benson. Prior to Morgan & Wright entering the United States Tire Co., Mr. Philp was vice-president and general sales manager of that company.

RUBBER PRODUCTION IN 1911

Washington, D. C., May 27—The Daily Consular and Trade Reports gives the world's production of plantation rubber in 1911 as 5,000 tons more than in 1910, being estimated at 85,000 tons, with prices ranging from \$3.12 to \$1.25 as against \$1.95 to \$1.09 for the previous year. Hard Para rubber, with a slight decline in output, varied in price from \$1.75 to 94 cents as compared with \$3.04 and \$1.33 per pound in 1910.

Great Britain imported rubber in 1911 to the amount of 45,300 tons, an increase of 1,450 tons over 1910, with a smaller stock on hand at the end of the year. The greater amount of rubber offered at auction sales served to eliminate the speculative element and tended toward greater stability in price.

NEW DEFENSE IN CHAIN SUIT

New York, May 28—Appeal of the Atlas Chain Co. in the suit instituted by the Weed Chain Tire Grip Co. was presented in the United States circuit court of appeals on Monday and the case was taken under advisement. The only new feature of the presentation was the introduction by the Atlas attorney of a defense predicated upon the Thompson armor plate. This device consists of a series of steel plates attached to the wheels of a road vehicle, overlapping as the wheel revolves.

F. S. Duncan on behalf of the Weed company alleged that such a device would prove to be similar in its effect to putting skates on a motor car and disclaimed any possibility to overthrow the Parsons non-skid patent by such an analogy.

HOPEWELLS BEGIN SUIT

Newton, Mass., May 27—Hopewell Brothers, of this city, have sent out notices to the trade that suit has been commenced in the United States district court at Boston against the Linscott Supply Co. for alleged infringement of patents 859,215 and 881,411, covering an improved type of annular tire case, the chief feature of which is its system of draw strings to hold the case firmly upon the tire.

BIG FIRE IN CLEVELAND

Cleveland, O., May 27—Over \$175,000 loss by fire was suffered by four concerns occupying a two-story building in Euclid avenue near East Nineteenth street today. The flames originated in defective wiring in the garage of the Jackson Motor Car Co., and motor cars worth \$30,000 were destroyed. Other losers were the Firestone Tire Co., \$75,000, and Grabowsky Power Wagon Co., \$10,000.

TRADE ASSOCIATIONS TO MEET

New York, May 28—New York will be the mecca of the motor car industry next week when all the great national organizations have meetings scheduled. The National Association of Automobile Manufacturers and the Automobile Board of Trade hold regular meetings on Wednesday. The American Automobile Association will meet in semi-annual convention on Thursday. The directors of the Motor and Accessory Manufacturers assemble on Thursday and the truck convention, the second of its kind in the history of the industry, will be called to order at the headquarters of the N. A. A. M. on Tuesday of next week.

WILL JOB GARAGE SUPPLIES

St. Johnsbury, Vt., May 27—The first wholesale motor car supply house in the United States to be owned and controlled exclusively by garagemen and agents was formed here this week and named the Consolidated Automobile Co. Howard B. Blossom, one of the proprietors of the Union Garage and Machine Co. of St. Johnsbury, who has handled the Buick line for several years, organized the company, getting in men from New Hampshire and Vermont.

The officers of the new company are: G. H. Davis, Barton, Vt., president; Fred C. Cleveland, Lancaster, N. H., vice-president; Howard B. Blossom, St. Johnsbury, Vt., treasurer and general manager; R. A. Preston, St. Johnsbury, secretary; Fred Johnson, Concord, N. H.; Fred C. Cleveland, Lancaster, N. H.; C. L. Bailey, an

Ruling in Full in Electric Light Case

Woodsville, N. H., Garfield Miller, White River Junction, Vt., J. Lynch, Littleton, N. H., N. E. Parks, Colebrook, N. H., J. H. Stewart, McNidoes, Vt., H. B. Blossom, St. Johnsbury, Vt., G. H. Davis, Barton, Vt., directors; Professor H. Stanard, Barton, Vt., and H. M. Nelson, St. Johnsbury, Vt., auditors; H. B. Howe, St. Johnsbury, Vt., clerk.

The new company is to act as jobber for garage supplies, and under the plans mapped out it will get its goods at wholesale price and then selling the goods to the different individuals comprising the company and also to the hundreds of other garage and repair men in the northern New England section not only get their own supplies at a lower rate but also be able to pay dividends to themselves annually.

APRIL CUSTOMS TRANSACTIONS

Washington, D. C., May 27—The monthly statement of customs transactions show the total value of exports during April to have been \$176,100,000. This is almost \$22,000,000 more than April, 1911. Imports for April totaled \$162,700,000, which is over \$42,000,000 more than in April, 1911. For the first 10 months of the fiscal year exports were \$1,865,300,000, against \$1,726,500,000. Imports during the same period were \$1,366,800,000, against \$1,274,600,000. Crude rubber importations for the first 10 months of the fiscal year were 425,000,000 pounds, against 303,000,000.

WAR SLOWS RUBBER OUTPUT

New York, May 20—Rebellion in the Acre, that district lying between Peru, Bolivia and Brazil and claimed by each of them at various times, has resulted in checking the free movement of rubber into Manaos. Fragmentary reports from various South American capitals mention the revolt, but do not particularize. The Acre raises a large amount of high-grade crude rubber which is shipped down the river to Manaos and other ports. During the past year the situation has been quiet in the Acre than it had been for several years before and news of this latest revolt is awaited with interest by the rubber trade all over the world. It is reported that the rebels have taken the initiative in stopping shipments. During the first 10 days of May, the receipts at Para were 1,200 tons, which is well above the average for such a period.

CHALMERS DIVIDEND DECLARED

Detroit, Mich., May 27—The Chalmers Motor Co. has just declared a dividend of 2½ per cent on its capital stock of \$3,000,000. This is the third dividend that has been declared on this stock this year, making 10 per cent dividend on this stock since January, 1912. This year's business shows an increase of 43 per cent over last year.

Judge Sanborn Holds Patent of Percy C. Avery Is Valid and Decides Against Milwaukee Bronze Castings Co.—Paper Covers Parabolic Reflector for Motor Car Use

MILWAUKEE, WIS., May 23—As briefly reported in the last issue of Motor Age, Percy C. Avery, of Milwaukee, owner of the Avery Portable Lighting Co., has won his suit against the Milwaukee Bronze Casting Co. for alleged infringement of his patent No. 986,668 covering a reflector for motor car lamps. Judge A. L. Sanborn, of the United States district court of the western Wisconsin district, sitting in the eastern district of Milwaukee, has handed down a decision holding the patent to be valid, holding the Milwaukee Bronze Casting Co. an infringer, and ordering a decree to be entered accordingly.

The decision goes into the history of electric lamps for motor vehicles and acknowledges the Perry patent, No. 650,418, covering a spun metal reflector placed inside of a shell. The decision credits Mr. Avery with originating a much more simple device of greater durability, constituting a distinct step in advance. The decision in full was as follows:

The date of the invention is carried back to September 22, 1909, by the evidence. In the specifications the inventor states that the reflectors in common use are made of sheet metal, usually copper, stamped to approximately the desirable parabolic shape, then plated with silver or nickel, but that a true parabolic surface cannot be imparted to stamped sheet metal as a thin metal is injured by heat, is easily bent and dented, and will not retain the desired shape, so that the reflector then in use did not project the light in a thoroughly efficient manner. He further states that the primary object of his invention is to provide a reflector for lamps such as commonly used on motor cars, which cannot be bent or dented, which may have imparted thereto a true parabolic surface, which will retain such surface in usage, and which will be non-corrosive and efficient.

The file wrapper shows that the inventor claims in his first four claims a cast metal reflector for lamps having an integral polished reflecting surface, parabolic in shape, and having lugs cast integrally therewith. The fifth claim, which was allowed as the first claim in the patent, reads as follows:

"A cast metal reflector for lamps having a circular flange concentrically cast on the outer surface thereof, and having an integral polished reflecting surface."

The inventor also claims in his sixth claim a combination with the reflector described in the count above quoted, a lamp supporting plug extending concentrically through the reflector surrounded by said circular flange; a lamp supported within the reflector by said plug, and a cover removably secured to said circular flange for supporting the outer end of said plug. Three process claims were also included.

The examiner did not disallow the claims, but required a division because the first five claims and the process claim were classified in the patent office under optics, while claim 6 was classified under illumination, and there being a clear line between the two sets of claims, division therefore was required. In response to the request of the examiner the applicant first cancelled claim 6 and requested reconsideration. The examiner again requested division between claims 1 to 5 and 6, 7 and 8. The later requirement of division was waived, and the first four claims rejected on the prior art, and claims 6, 7 and 8 were also rejected because they were thought to cover merely the obvious steps in the production of the article. The applicant then cancelled all the claims except claims 5, and suggested another claim reading as follows:

"A cast metal reflector for lamps having attaching lugs cast integrally therewith, said reflector having a circular flange concentrically cast on the rear outer surface thereof, and

having an integral polished reflecting surface." This claim was allowed, together with the original claim 5, and patent issued.

It will be seen from this statement of the contents of the file wrapper that the applicant did not give up any part of his invention, simply yielding to the position of the examiner, that claim 6 for the combination of the lamp socket with the reflector was so obvious not to require statement in a claim.

Complainants' commercial forms show a cast metal reflector with a circular flange at the rear which is used as a housing for the electrical connection and the socket of the lamp which projects forward into the rear part of the reflector. A tight cap is placed over the flange to protect the electrical connections from the weather. The testimony shows that on April 5, 1910, complainant company gave an order to the defendant for the manufacture of castings for use in the patent lamp. This order contained the following statement:

"It is further stipulated, in consideration of this order, that you will not mold or cast any lamp reflector from these patterns for any firm, person, or persons, otherwise than ourselves."

Defendant made castings and delivered them to complainant, but they proved unsatisfactory, and a part of them were returned. In the fall of 1910, and before the patent was issued, defendant made a lamp substantially like the Avery lamp, but upon patent being issued discontinued the manufacture of that form. After the issue of the patent defendant changed its construction by making a lamp very similar to the patent device, but instead of having the circular flange at the rear cast integrally with the reflector, defendant substituted a cap which it fastened to the reflector by bolts or screws near the body of the lamp, using only a very small flange for the purpose of anchoring the cap.

In appearance the two lamps were substantially the same. In other words, the defendant simply cut off the circular flange of the complainant near the body of the reflector, but in all other respects conformed almost exactly to the patent form. Later on complainant enlarged the opening into the reflector from the circular housing so that the lamp could be withdrawn from the rear without opening the lamp in front. Defendant followed by a like improvement. Still later a suggestion was made to defendant by a person who had seen the patent lamp in Chicago in respect to changing the brass rim or bevel of the reflector by making it more rounding or bulging. Defendant has uniformly paid the complainants the compliment of copying the patent form and commercial form as near as possible, but avoided the letter of the claims in so doing.

The main difference between the prior art and the patent form is that the spun metal lamps of the prior art consisted of a reflector placed inside of a bell-shaped shell giving room for the electrical connection.

The prior art shows several forms of reflectors with circular flanges, designed, however, for an entirely different purpose. The nearest approach to the complainants' design in the prior art is the Perry patent of May 29, 1900, No. 650,418. The Perry drawing shows that between the reflector and the shell of the lamp there is a complicated arrangement for the electrical connection. The claim of the Perry patent covers a combination of seven elements. The lamp is made of spun metal, with all the objections referred to in the specifications of the Avery patent. For this complicated device Avery substituted a simple cast metal reflector, limiting the invention to two or three elements, making a more durable lamp, and one of great simplicity. In view of the prior art while the Avery patent constitutes a distinct step in advance, it is no doubt subject to a limited construction with a narrow range of equivalence.

Defendant's lamp is substantially the same as Avery's, which has been copied as near as possible so as to avoid the letter of the claims. It makes no difference whether the circular flange is made longer or shorter, or whether the cap used as a housing for the electrical connection be made to include the circular wall, or whether such walls be cast integrally upon the body of the reflector. It is of no consequence at what point the circular wall is cut off, whether near the outer cap or near the body of the reflector. Within the narrowest rules of construction, both are substantially the same.

The patent should be held valid and infringed, and a decree be entered accordingly.

Trail for Farmers' Reliability Blazed

Scouts Log Route and Lay Out 9-Day Tour—Distance From Dallas to Coast and Back Again Is 1169 Miles—Many Entries Are in Sight for Unique Contest in the West

SAN ANTONIO, TEX., May 25—Interest is high in the tour for farmers and stockmen, to be held in August by the Farm and Ranch magazine of Dallas, under A. A. A. sanction. Entries have started to come in rapidly, and more than 100 cars are due to enter the event. The problem that now is claiming attention is that of handling this novel contest with so large a field of entrants.

The scouting party, comprising a Case pathfinder and a Kisselkar for the press, has completed the logging trip and the official log shortly will be issued. The distance covered from Dallas to the coast and back again was 1,169 miles, over a great variety of country and road conditions. The pathfinding trip required 12 days—8½ actual running days—a pause being made in San Antonio because of the muddy condition of the roads south of this city.

The cars made the trip in excellent shape, the only engine trouble being water in the carburetor while crossing a stream. The Kisselkar made the trip on the same air, returning to Dallas without blowout or puncture. All along the route the pathfinding party enjoyed an ovation, and entries were offered along the entire route. Bands met the party and speeches were made at nearly every town, while the motor clubs tendered receptions. The entries of the tour, it now appears, will come from all over the state, and several companies have offered to enter luggage and accessory trucks.

Interesting good road data was compiled on the pathfinder jaunt—a subject in which the Texas people now are taking a very keen interest. On the route of 1,169 miles, 510 miles of paved or macadam road in fine condition was found. There were 260 miles of very good dirt road. Through south Texas there was much mud on the dirt going, due to recent rains, while in east Texas considerable sand was encountered. The description of the roads as given out upon the return to Dallas is as follows:

First day—Dallas to Milford, through Lancaster, Red Oak, Waxahatchie and Italy, fine graded pikes of limestone and gravel. From Milford to Abbott, through Hillsboro, dirt roads in poor condition. From Abbott through west to Waco, very good dirt roads and 7 miles of pike to Waco, the night control.

Second day—Waco to McGregor, fine gravel pike. McGregor to Temple through Moody, 10 miles of gravel, balance good dirt road. Temple to Granger, through Holland and Bartlett, rough clay road and some sand. Granger to Austin, through Taylor and Hutton, fine pike all the way. Austin, night control.

Third day—Austin to San Antonio, through San Marcos and New Braunfels, excellent pike all the way, New Braunfels to San Antonio best on trip. San Antonio, night control.

Fourth day—San Antonio to Smiley, through Sutherland Springs, some pike, but mostly clay and sand. Smiley to Cuero, first part a

lost trail and almost impassable, sand and frequent mud holes. Rest of way quite good dirt road. There is a much better way than this through Seguin and Yoakum. Cuero, night control.

Fifth day—Cuero to Victoria, fine graded pike. Victoria to El Campo, through Edna and Ganado, graded dirt road, very heavy and in some places covered with water. El Campo, night control.

Sixth day—El Campo to East Bernard, through Wharton, heavy mud and clay. East Bernard to Richmond, fair dirt road. Richmond to Galveston, through Houston, peerless road of hard, packed shell. Galveston, night control.

Seventh day—Galveston to Harris County line through Houston, fine shell road. From county line to Bryan, through Hemstead and Navasota, much sand and two sticky bottoms. Bryan, night control.

Eighth day—Bryan to Calvert, deep sand and heavy pulling. Calvert to Corsicana, through Groesbeck and Mexia, well-dragged dirt roads. Corsicana, night control.

Ninth day—Corsicana to Dallas County line, through Ennis, well-dragged dirt roads and short stretch of pike. County line to Dallas, fine limestone pike.

MUST DO MORE THAN BLOW HORN

Boston, Mass., May 25—According to a decision of the supreme court of Massachusetts handed down this week "blowing a horn on a motor car does not give any exclusive right of way or relieve the driver from the duty of proceeding at a reasonable rate of speed and keeping his car in control when approaching a busy thoroughfare." The decision resulted from an appeal made by Amos H. Whipple, a Boston hotel man, against whom was rendered a verdict for \$2,000 as the result of his car striking Albert E. F. Rasmussen, a newsboy, on Blue Hill avenue, Mattapan, in April, 1907. The boy died as a result of his injuries and suit was brought by his father, Lauritz F. Rasmussen.

The statute making it *prima facie* evidence of negligence to run a car at 8 miles an hour in approaching or crossing an intersecting street is held not to apply here because the motor car had passed the nearest intersecting thoroughfare. There was some dispute as to the rate of speed at

which Mr. Whipple's car was traveling, some witnesses stating that it was traveling 18 miles an hour, while others testified that it was going only about 8 miles. However, in its decision, the court states that the driver did not have a license to travel at a speed of even 8 miles an hour under the circumstances as brought out in the evidence. Here is what the court says on this point, and it is interesting to all owners of motor cars:

Every person operating a motor car on our ways must run it at a speed that is "reasonable and proper, having regard to the traffic and the use of the way and the safety of the public." And the jury would be warranted in finding that it was negligent to run the motor car at this place, under the circumstances then existing, at a speed of 8 miles per hour or even less. The statute then in force did not relieve the driver of the machine from exercising reasonable care to avoid injuring other travelers with equal rights on the public way. There was testimony that the signal horn was sounded, but it was not heard by a number of witnesses to the accident, and, under the circumstances, the jury could infer that it was not sounded loud enough or sufficiently near the place of the accident to give timely warning. Nor is it contended that even the loud blowing of a horn would give to the motor vehicle any exclusive right of way or relieve the driver from the duty of proceeding at a reasonable rate of speed and keeping his car in control when approaching a busy thoroughfare. There was evidence for the jury of the defendant's negligence.

QUAKERS ORDER FIRE TRUCKS

Philadelphia, Pa., May 25—Contracts for the first instalment of motor-driven fire apparatus to supplant horse-drawn equipment were awarded today by Director of Public Safety Porter and Assistant Director of Public Works Reed. Two contracts were awarded, one calling for a combination hose wagon and ladder truck, to carry 2,100 feet of hose and attain a speed of 30 miles an hour; the second contract calls for two combination chemical engines and hose wagons, to attain an approximate speed of 35 miles an hour. The first contract was captured by the International Motor Co., 635-637 North Broad street, at a cost of \$4,750; the second by James Boyd & Brothers, at a cost of \$4,993 each. Neither was the lowest bidder, but



CASE PATHFINDER AND KISSELKAR PRESS CAR ROUTING FARMERS' RELIABILITY

France Wants Real Touring Contest

in each instance the plant and equipment of the bidding concerns were taken into consideration in making the awards to the bidders.

The combination hose wagon and ladder truck upon completion will be stationed in the fire house at Sixth and Lehigh avenue; one of the chemical engines at Sixth and Lehigh avenue; one of the chemical engines in the recently constructed fire station at Fifty-fifth and Pine streets, the third one as yet unplaced.

It is the plan of Director Porter to soon advertise for bids for eleven high-speed cars, to be placed at the disposal of district engineers on the outskirts of the city, where a large amount of ground has to be covered.

FIRST MUNICIPAL PARADE

Indianapolis, Ind., May 27—The first municipal parade ever held in the United States commemorating a reduction in fire insurance rates through the acquisition of motor fire apparatus was held in this city last Friday afternoon. There were 1,100 city officials and employes in line, all municipal departments being represented in full.

Probably the most attractive display was that of the fire department, around which most interest centered. The motor apparatus in the fire department includes a touring car for the chief, two squad wagons, two combination hose and chemical wagons, a ladder truck and a combination pump and hose.

Mayor Shank and Richard Lieber headed the parade in a snow-white Cole. Mr. Lieber was chairman of the committee of the mayor's advisory commission which conducted the investigation leading to the reduction in fire insurance rates, which reduction amounts to about \$150,000 annually. All of the municipal motor cars were in line, ranging from runabout to the ambulances used by the city hospital and city dispensary. A half holiday was declared by the mayor for the event.

Reliability Next Spring Calls For Daily Runs Which Will be from 200 to 250 Miles—Vital Parts Will be Sealed and Repairs Without Penalizations Will Not be Permitted

PARIS, May 18—After holding one reliability touring competition under somewhat lax rules, France will have a second tour next spring under conditions as difficult as it is possible to make them. A total distance of 2,500 miles will have to be covered in daily stages varying from 200 to 250 miles, at an average speed of 19 miles an hour on three sections of each day's run. Speeding will not be allowed, for the committee will have the right to hold back any man considered too far ahead of his time, while every one failing to keep up to the average will be penalized 1 point per kilometer below the minimum, and will be disqualified if an average of 15½ miles an hour is not kept up.

Before starting on the run the cylinders, gearbox, radiator, front and rear springs, steering gear, clutch and under pans for motor and transmission will be permanently sealed. The breakage of any one of these seals will entail disqualification. In addition, the radiator filler cap, the bonnet and the footboards giving access to the clutch and gearbox will be sealed down every morning after the elapse of 10 minutes for oiling. It is believed that these 10 minutes should be sufficient to give the car whatever attention it may need in the matter of oiling and slight adjustment, after which it must make the day's run without a tool being touched.

If the radiator cap is taken off, a penalization of 2 points will be imposed; for the breakage of the bonnet seals the penalty will be 10 points; for breaking the footboard seals, 5 points. Attendant cars carrying spares, tires, oil, gas, etc., will not be allowed. This rule has become necessary in order to prevent competing firms providing a powerful car to nurse the competing ones. The time lost in looking for

oil and gasoline is often considerable, and the presence of a store car carrying a supply gives a decided advantage.

Only purely stock cars listed at not more than \$1,600 chassis without tires are allowed to take part in the competition. This provides for the medium sized car—four-cylinder models of less than 4 inches bore—and gives absolute liberty in the choice of the bodywork. A top, windshield and lamps must be included, whatever the type of body fitted. It is probable that the competition will be held during the month of March, the route being a circle round France.

GRAVEL CHOSEN FOR ROAD

Milwaukee, Wis., May 27—The Chicago-Milwaukee Good Roads Association, which purposes to improve and maintain one good main-traveled highway between Chicago and Milwaukee, has decided to prepare a gravel roadbed and surfacing, instead of the more expensive and none the more utilitarian macadam. Work on the actual improvement of the road was started May 27. The association has purchased a 10-ton tractor, a grader, scarifier and other equipment. The road will be graded a uniform width of 24 feet, with a graveled roadbed of 9½ feet. Every farmer living along the route has promised to co-operate and the town boards, without exception, will do their part.

WANTS MODIFIED RULES

Boston, Mass., May 25—D. C. Tiffany, representing the Electric Vehicle Club of Boston, called on Mayor John F. Fitzgerald last week and requested that he take up the matter of traffic regulations with the street commissioners of Boston to see if a compromise might not be reached that will benefit motor car owners. He pointed out that at present because of rules in force owners of motor cars cannot come down town to do their shopping unless they have someone drive their cars who will keep the machines moving about, returning at a designated time for the owners. This means that sometimes the shoppers cannot do their purchasing, as the time is not long enough and mixups follow.

Mr. Tiffany said that the time limit for allowing trucks and cars to stand beside business establishments should be lengthened. He requested that owners of cars be allowed to let them stand on Tremont street beside the common evenings while they are attending the theaters. He pointed out that the present traffic regulations were put in force some years ago and that they are not adequate for present conditions.



AN INCIDENT IN THE PATHFINDING TOUR FOR FARMERS' RELIABILITY

Sights at Starved Rock

Illinois' New State Park Remarkable for Its Great Scenic Beauty

PARAPHRASING the familiar admonition to "see America first," the loyal resident of the Sucker state, will enthusiastically acclaim, "see Illinois first." The driver who is commencing to assemble ideas concerning a summer tour, will no doubt be impressed by the advantages offered and the attractions pictured in most of the states of the middle west. The transcontinentalist who perhaps is making up his itinerary for a coast-to-coast tour, doubtless is open to suggestions and perhaps will have no lack of them. Illinois cordially invites the middle west drivers as well as those of the Atlantic and Pacific districts who are planning to cross country, to consider the claims of Lincoln's state. While the loyal residents of the commonwealth consider Illinois to be one vast rose garden and also abounding in scenic beauty and attractiveness, and rich in historical associations, yet it is realized that an excess of boasting will weary rather than interest.

Much could be said of the Nauvoo district and the beautiful plateau overlooking the Father of Waters; the picturesque Vermillion river in eastern Illinois; of Fort Massac and historic Kaskaskia; of the mysterious mounds of Madison county, the strange relics of the antediluvian era; and also other attractions, but the one which will appeal to all and which should be seen by all, especially if the time is limited, is Starved Rock, just purchased by Illinois for a public park and which for the first time this year, is free to all.

The motorist who tours Illinois and fails to visit the picturesque Illinois Valley, will have many regrets. There is nothing to equal it east of the Rockies, it is claimed. Starved Rock is but a 75-mile run from Chicago. The road via Joliet and Morris is the best for those coming from the north. Those from the east, west or south, should head for Ottawa and LaSalle. The roads to the historic pile from all directions are excellent and regarded as the best in Illinois. The car can be driven to the principal points of interest with entire safety and a glorious view or rather series of views, will reward the tourist.

Even if it was not for the historic associations and the pathetic story of the Illini, who met a tragic fate upon the summit of the lofty mount, the panorama of the valley, well repays a visit. At one time, what is now Starved Rock park, was located the most populous Indian town in America. About the canyons cling wonderful legends of the red men and weird bits of Indian history, some of it interwoven for the time, with that of the French explorers. Two and a quarter centuries have elapsed since the French tricolor floated from the crest of Starved

Routes and Touring



BRIDAL VEIL FALLS AT STARVED ROCK, ILL.

Rock and the permanent settlement established at its base. The vicinity teems with history and folklore. It has been felt for many years that a place so rich in scenic beauty and historical associations, should not be left to the mercenary spirit of the age. Starved Rock was the first central point of civilization in the Mississippi Valley. It was there that Tonti built Fort St. Louis and there was begun the French empire which was the dream of La Salle. While shadowy memories of the long ago will ever linger, yet Starved Rock will loom up more prominently in the future than it ever did in the past, figuring as it will in the setting of the great public park as chiefest gem. It is as wonderful as any bit from the Yosemite or the canyon of the Yellow-

stone. It is the one piece of unspoiled nature in Illinois.

Back and south of it and stretching up and down the valley as far as the eye can reach, is a palisaded, forest-covered bluff. Thanks to the ruggedness of the bank, it has not been defaced by railroads or trolley lines and the vicinity still retains the rank growth of trees, shrubs, wild flowers and ferns, as fresh and as primitive as when they were first seen by Father Marquette. It is probable that there was once a western Niagara which was gradually reduced by erosion until there was left a canyon with sharply defined walls.

Starved Rock, an escarpment of the main bluff, stands alone, rising abruptly from the swiftly flowing Illinois, to a height of 150 feet. The summit of the

Information



BEAUTIFUL GLEN AT FOOT OF STARVED ROCK

rock, an acre in extent, furnishes a beautiful and imposing view, conceded by globe-trotters to be the finest bit of landscape in the United States. It is as if a section of Colorado scenery was transferred to the prairies of Illinois. It will be a matter for general rejoicing that Starved Rock has come into its own as the great beauty spot of Illinois, free to all the people, and, as such, it will be jealously guarded for all time to come. The tourists will find excellent hotel accommodations at the rock or at Ottawa or La Salle in case it is desired to spend several days at the resort.

LONG TRIP WITHOUT MISHAP

Philadelphia, Pa.—Editor Motor Age—In a 1909 Franklin which had previously gone 28,000 miles, my wife and I recently

made a trip from Chicago to Scranton, 1,000 miles, in 6 days—and this without a puncture and without opening the tool box.

The running time was 56 hours, or an average of 18 miles per hour. The total cost for the car was \$27.25, which included washing and polishing every night. We used 68 gallons of gasoline, an average of over 14½ miles per gallon; and 5½ gallons of lubricating oil, an average of 173 miles per gallon.

So much for efficiency; but more than this: The fact that with an average of 166 miles each day, we were no more tired from driving than we would have been after a day's ride in a Pullman. No extra shoes were carried by us on this trip.—Homer C. Rice.

Roads in Middle West

Correspondent Desires to Journey Through Nebraska and Wisconsin

DENVER, COLO.—Editor Motor Age—Kindly publish the log and map from Grand Island, Neb., to Aurora, York, Seward and Lincoln, Neb., St. Joseph, Kansas City, St. Louis. We wish to return to Kansas City and continue to Colorado Springs, Colo. What is the general conditions of the roads and accommodations? We shall leave some time in July.—B. Donald.

By the time you go through the road to York will be pretty well sign boarded and you cannot lose the route. Go directly north out of Grand Island, crossing the North Channel, turning east a short distance beyond into the road that leads over the Platte river to Aurora and York, probably 45 miles distant. The state road continues 29 miles to Waco and Seward, and by motoring about 23 miles further you reach Lincoln on the Omaha-Denver transcontinental trail. Headed south for Marysville over level country and good dirt roads you travel 78 miles through Princeton, Cortland, Pickrell, Beatrice, Blue Springs, Wymore, Okato; traveling in an easterly direction 113 miles over rolling country you reach St. Joseph routing through Honey City, Beattie, Axtell, Baileyville, Seneca, Oneida, Sabetha, Hiawatha, Highland, Manning, Troy, Blair, Wathena and St. Joseph. To Atchison, Kans., it is 28 miles through De Kalb and Rushville over a hilly but fair dirt road. To Kansas City there is a good dirt and macadam road through Lovemont, Leavenworth, Lansing and Kansas City, a distance of 57 miles.

A road entirely in Missouri which you can follow between Atchison and Kansas City is the interstate trail which passes through Dearborn, Edgerton, Trimble and Smithville, entering Kansas City over the Swift-Armour-Burlington bridge. By following this road your distance will be 63 miles.

The motor car road between Kansas City and Missouri lies through Centropolis, Independence, Blue Springs, Grain Valley, Oak Grove, Bates City, Odessa, Mayview, Higginsville, Corder, Alma, Blackburn, Mt. Leonard, Shackleford, Marshall, Slater, Gilliam, Glasgow, Armstrong, Yates, Higbee, Renick, Clarke, Mexico, Martinsburg, Wellsville, Montgomery, New Florence, High Hill, Jonesburg, Warrenton, Truesdale, Wright, Forrestell, Wentzville, Cottleville, St. Charles, Wellston and St. Louis, a distance of 311 miles. The only suitable night stops crossing Missouri are Marshall and Mexico. Through Kansas to Colorado Springs two good roads are offered you, one the historic Santa Fe and the other the Golden Belt route a trifle north. The Santa Fe has excellent hotel accommodations, and if time is no

object it is always recommended; on the other hand, the most direct route is the Golden Belt.

The Golden Belt route passes through the following towns: Shawnee, Zarah, Monticello, Cedar Junction, De Soto, Eudora, Lawrence, Newman, Topeka, Wamego, Manhattan, Ogden, Junction City, Chapman, Detroit, Abilene, Solomon, New Cambria, Salina, Kanapolis, Ellsworth, Wilson, Dorrance, Bunker Hill, Russell, Gorham, Walker, Victoria, Hays, Ellis, Ogallala, Wakeeney, Voda, Collyer, Quinter, Buffalo Park, Grainfield, Grinnell, Oakley, Monument, Page City, Winona, McAllaster, Wallace, Sharon Springs, Weskan, Cheyenne Wells, First View, Kit Carson, Sorrento, Wildhorse, Ayra, Boyero, Mirage, Huga, Limon, Resolis, Mattison, Ramah, Calhan, Colorado Springs. Following this road your first night stop would be Topeka, 77 miles, or Junction City, 161 miles; second night, Wilson, 106 miles from Junction City, or Wakeeney, 86 miles further; Sharon Springs is 114 miles from Kakeeny; to Limon it is 127 miles distant and then 82 miles to Colorado Springs.

On the Santa Fe you route through Olathe, Gardner, Edgerton, Wellsville, Ottawa, Homewood, Ransomville, Williamsburg, Silkville, Agricola, Waverly, Emporia, Saffordville, Cottonwood Falls, Elmdale, Clements, Florence, Peabody, Walton and Newton, which you should make your first night stop, 214 miles distant. Newton to Dodge City, 186 miles, the next day's run, is through Halstead, Hutchinson, Nickerson, Sterling, Lyons, Chase, Ellinwood, Great Bend, Dundee, Pawnee Rock, Larned, Garfield, Kingsley, Taft, Offerle, Spearville, Wright and Dodge City. To La Junta it is 221 miles and the trail continues through Sears, Howells, Cimmeron, Ingalls, Charleston, Piercerville, Garden City, Lakin, Hartland, Kendall, Mayline, Syracuse, Medway, Coolidge, Holly, Grenada, Keon, Grote, Morse, Lamar, Hasty, Las Animas, and La Junta. There is a good fast road on into Pueblo, 65½ miles, through Swink, Rockyford, Manzanola, Fowler, keeping out of Nepesta and Boone, skirting Avondale, and directly into Blende and Pueblo.

A distance of 44 miles to Colorado Springs takes you through Eden, Bragdon, Dawkins, Wigwam, Buttes, Little Buttes, Fountain, Skinners over a level road almost the entire distance.

For running directions on all territory west of the Mississippi you are referred to the Blue Book, volume 5.

FOR TRANSCONTINENTAL TOURISTS

Always have an extra supply of gasoline and oil with you. As for equipment, a complete set of tools, extra casings and inner tubes, canvas bucket for carrying water, some rope, extra spark plugs, jack, etc., might be suggested. Never be without a supply of drinking water and especially in Nevada, and it is quite a good plan to carry something to eat in the way of crackers, cheese, or sardines, etc.

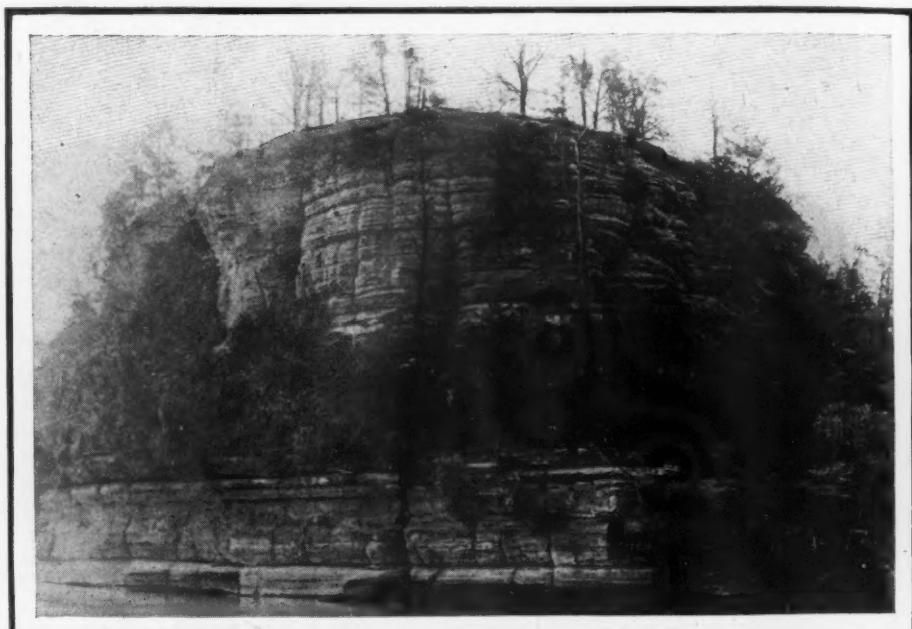
Cross-Country Motor Touring Popular

Advice to Readers Who Write for Routes to the Pacific Coast and Other Far Western Points

WATERLOO, IA.—Editor Motor Age— Myself and family are thinking of a trip to San Diego, Cal., in a touring car. What route is the safest for a car making the trip alone? Is there an airless tire made or is there a tire equipment in the way of extra outside covers for tires?— W. F. Curtiss.

A transcontinental tour need not fill you with terror; it is not a difficult or dangerous undertaking any longer. There

Schuylerville, Columbus, Silver Creek, Clarks, Central City, Grand Island, Alda, Wood River, Shelton and Kearney, distance of 208 miles, while a section of the Omaha-Denver transcontinental road over which you can travel makes your distance 227 miles and leaves Omaha by way of Hanscom park, Lincoln avenue and 12 miles to Millard, then Chalco, Gretna, Melia, Ashland, Greenwood, Waverly, Havelock, Lincoln, Emerald, Milford, Dorchester, Friend, Ex-



STARVED ROCK IN ILLINOIS' NEW STATE PARK

are numberless route books which give running directions, maps, road conditions, cautions for dangerous places, etc., and with these to guide you even the most timid can feel at ease. If you secure a Blue Book, volume 5, you will find the main roads from the Mississippi to the Coast outlined. The Lovejoy Novelties Co. of Laramie, Wyo., has running directions on routes in Wyoming, and the Salt Lake City Tribune of Salt Lake, Utah, publishes a route book which covers the territory from Evanston to Reno, Nev.

By motoring southwest through Hudson, Reinbeck, Morrison, Grundy Center, and Conrad, you reach the Iowa transcontinental road at Marshalltown and follow it west, passing through State Center, Colo., Nevada, Ames, Jordan, Boone, Beaver, Grand Junction, Jefferson, Scranton, Ralson, Glidden, Carroll, Arcadia, West Side, Vail, Denison, Arion, Dow City, Dunlap, Woodbine, Logan, Missouri Valley, Honey Creek, Rells Store, Crescent, Council Bluffs and Omaha. Omaha to Kearney offers two roads, both good.

The North Platte road routes through Arlington, Fremont, Ames, North Bend,

eter, Fairmount, Grafton, Sutton, Saronville, Harvard, Inland, Hastings, Juanita, Heartwell, Minden and north to Kearney. Continuing on the North Platte road into Wyoming, your route lies through Odessa, Elm Creek, Overton, Lexington, Cozad, Gothenburg, Maxwell, North Platte, Sutherland, Laxton, Korty, Ogallala, Bigspring, Julesburg, Chappell, Sidney, Kimball, Bushnell to Pine Bluff, Wyo.

Crossing Wyoming there only are two stretches of poor road. Passing through Egbert, Archer, Cheyenne, Corlett, Borie, Granite Canon, Buford, Tie Siding, Red Butte, Laramie, Bosler, Copper Lake, Rock River, Medicine Bow to Hanna you strike the first poor stretch between Hanna and Dan and on to Walcott and Fort Steel. It is quite hilly with considerable curves, but nothing that would give you trouble in dry weather. You continue to Evanston. This detour from Granger is only necessary when the river is high, for it can be forded in dry weather and the road followed through Carter, Bridger, and Altamont to Evanston.

When you leave Evanston you soon enter the State of Utah, traveling through

Three Plan Transcontinental Trips

Owners in Waterloo, Ia., and Oshkosh, Wis., Ask for Information—San Diego Motorist Interested

Rawlins, Riner, Latham, Wamsutter and Red Desert. From the next town, Table Rock, to Bitter Creek and Hallville to Point of Rocks is the second poor road, but this is only troublesome in wet weather. Motor through Thayer, Rock Springs, Greenriver, to Granger, then it is necessary to follow the Hams fork through Moxa, and Nutrie to Opal before you find a bridge crossing the river. Continue to Diamondville, Cumberland and

El Camino Real, through San Jose, Salinas, Soledad, San Miguel, San Luis Obispo, Santa Maria, Santa Barbara, Ventura, Hollywood and Los Angeles. Scenery from Reno to Los Angeles is magnificent.

In Nevada there is another road which gets considerable travel and that routes south from Cobre to Currie Cherry Creek, Ely, Currant, Blue Eagle, Twin Springs, Hot Creek, Tonopah, Goldfield, Blair, Silver Peak, Alvord, Big Pine, and along the

Stanton, Red Oak, Emerson, Hastings, Glenwood and Council Bluffs. You are referred to the communication headed Waterloo, Ia. for the balance of your routing.

As there are three inquiries for this same route why not get in touch with them and all arrange to make the trip together?

Most people have a wrong impression of the desert sand roads. They are very hard and consequently a high speed is attainable; there are not many soft places.

Transcontinental touring has increased so the last year that there are not many places where you will be unable to get gasoline. Always keep your tank filled, and carry an extra can of it. A can of grease should be included in the equipment. You probably will have to ford some streams, but just how many Motor Age is unable to say. You always can inquire of some intelligent person and find out if the streams are shallow enough to be forded.

The Blue Book, volume 5, covers the territory west of the Mississippi, and it contains running directions of your trip.

The Reo driven by Whitman in August, 1910, followed a route through Albany, Schenectady, Utica, Syracuse, Buffalo, N. Y., Erie, Pa., Cleveland, Fremont, O., South Bend, Ind., Aurora, Ill., Clinton, Cedar Rapids, Marshalltown, Council Bluffs, Ia., Kearney, North Platte, Neb., Laramie, Green River, Wyo., Ogden, Kelton, Utah, Montello, Battle Mountain, Reno, Nev., Sacramento and San Francisco, Cal. This trip was made in 10 days, 18 hours.

HEADED FOR THE COAST

Oshkosh, Wis.—Editor Motor Age—I desire data on the best route from Oshkosh to southern California.—F. S. Hoaglin.

In the 1912 Blue Book, volume 4, you will find running directions on a routing through Pickett, Ripon, Brandon, Waupon, Beaver Dam, Columbus, Sun Prairie, Madison, Pine Bluff, Mt. Horeb, Blue Mounds, Barneveld, Ridgeway, Dodgeville, Mineral Point, Calamine, Platteville, Elm, Cuba, Dubuque, Centralia, Epworth, Farley, Dyersville, Earlville, Manchester, Independence, Jesup, Waterloo, Hudson, Reinbeck, Morrison, Grundy Center, Conrad and Marshalltown. A good road would be to Fond Du Lac, Theresa, Mayville, Iron Ridge, Woodland, Ashippun, Monterey, Oconomowoc, Dousman, Eagle, Little Prairie, Lauderdale Lakes, Elkhorn, Lake Geneva, Williams Bay, Walworth, Big Foot, Lawrence, Chemung, Belvidere, Cherry Valley, Rockford, Byron, Dixon, Sterling, Emerson, Morrison, Union Grove, Fulton, Lyons, Clinton, DeWitt, Grand Mound, Calumus, Wheatland, Lowden, Clarence, Mechanicsville, Lisbon, Mt. Vernon, Marion, Cedar Rapids, Belle Plaine, Chelsea, Gladstone, Tama, Montour, Butlerville and LeGrand.

The balance of the route is outlined in a communication headed Waterloo, Ia. As there are two other parties in this issue contemplating this trip you might like to get into communication with them with the idea of going at the same time.



CANYON NEAR STARVED ROCK STATE PARK

Wasatch, Castle Rock, Emory, Baskin, Echo, Henefer, Croyden, Devil's Slide, Morgan, Peterson, Gateway, Riverdale, Ogden, Pleasant View, Hot Springs, Willard, Brigham City, Corrine, Bear River City, Tremonton, Blue Springs, Snowville, Curlew, Kelton, Lucin, and Tecoma, Nev., just over the state line. It is not necessary to go into Kelton, but be sure and take the mountain road and keep away from Terrace, and after leaving Lucin follow the center road up the mountain and not the railroad, for Tecoma. Montello is the next town, and then follows Cobre, Wells, Deeth, Elko, Eureka, Austin, Alpine, Salt Wells, Fallon, Hazen, Wadsworth, Reno, Laughtons, Mogul, Verdi, Prosser Creek, Truckee, Lake House, Summit, Soda Springs, Cascade, Cisco, Emigrant Gap, Dutch Flat, Gold Run, Colfax, Applegate, Auburn, Newcastle, Penryn, Loomis, Roseville, Antelope, Sacramento, Antioch, Oakland, and San Francisco.

Routing first to San Francisco is considerably out of your way, but when anyone thinks of making such a long trip it is just as well to make it still longer and see as much of the country as possible. San Francisco to San Diego is over the famous

Sierra Nevada Mountains on the El Camino Sierra road through Independence, Lone Pine, Olancha, Little Lake, Ricardo, Mojave, Elizabeth Lake, Newhall, San Fernando, and Los Angeles.

A good tire protector if correctly applied probably will be better than airless tires.

TRANSCONTINENTAL TRAVEL

San Diego, Cal.—Editor Motor Age—I am thinking of driving from Burlington, Ia., to Los Angeles, Cal., in June or July and want to know what would be the best route. Would it be necessary to carry canvas for the desert sands? What streams would have to be forded and are there any stretches of 100 miles or more in which we would be unable to get gasoline? What route did the Reo take on the trip from coast-to-coast that was made in less than 11 days? Is there a guide book covering the trail from Iowa to the coast or would it take several?—C. O. G.

The Blue Grass road from Burlington to Omaha lies through Mount Pleasant, Fairfield, Ottumwa, Albia, Tyrone, Chariton, Osceola, Murray, Afton, Creston, Cromwell, Prescott, Corning, Nodaway, Villisca,

Grinding in the Valves

Best Methods of Procedure in Obtaining Proper Seating of the Bearing Surfaces

PHILADELPHIA, Pa.—Editor Motor Age—Kindly illustrate valve-grinding tools and the method of using them.

2—What is the output of DeTamble cars?

3—What is the largest special racer that is built? Is it not a Fiat 300 horsepower? Give specifications of it.

4—What care does a Bosch magneto require? What kind of oil should be used and how often?

5—What does S. A. E. stand for?—Samuel B. Horner.

The most common means and methods of grinding valves are shown in Fig. 2. To grind in a valve, the usual method is to take the valve out of the valve chamber, scrape the carbon from the valve chamber and seats, then block up the entrance to the cylinder with cloth to catch any particles of emery that would enter. To grind in a valve which is badly pitted it is well to begin with rather a coarse grade of emery. Apply a coat of cylinder oil to the face or seat of the valve, then dip the finger in the emery and apply that which adheres to it to the seat on the valve. Be careful to keep the stem clean so the guide will not be enlarged. Now, as shown in Fig. 1, with one hand on the screw driver or grinding tool, and the other near the valve stem, assume as comfortable a position as possible and grind. This is done by turning the valve about a half revolution back and forth on its seat in the cylinder, by means of the tool in the one hand, and occasionally lifting the valve from its seat and shifting it around with the other. The valve should be lifted about $\frac{1}{8}$ to $\frac{1}{4}$ -inch every five or six reversals, to keep the oil and emery well distributed. The pressure on the tool should be slight. Every few minutes the valve should be removed, the seats cleaned off and examined, and a new solution of oil and emery applied. When the pits are almost removed continue the operation with flour of emery instead of the coarser grade; remove the valve oftener, applying more oil and less emery each time, till a good seat is obtained all around; then finish up by polishing the seats with oil. Kerosene is most effectively used in finishing the seats of a valve, and the higher the polish obtained the less chance for a carbon deposit.

There are many mechanics who maintain that a valve cannot be properly ground-in unless it is done entirely by hand with an ordinary screwdriver; this, however, is not true, for a brace and bit with a spring behind the valve, as illustrated in Fig. 2, can be most advantageously employed if the same care is used in changing and distributing the ab-

The Readers'

Oil Gun May Be Changed Easily for Filling Compression Grease Cups, Says Correspondent—Valve-Grinding Tools and How to Use Them



FIG. 1—GREASE GUN FOR COMPRESSION CUPS

rasive as would be used if a screwdriver were employed. The screwdriver method is so tiresome that the frequent rest periods, which are employed either in changing or examining the valve seats, insure that this feature of the work is well done; with the brace and bit, the grinding is rendered so easy that the operator is liable to neglect raising the valve at frequent intervals or removing it and applying fresh abrasive. To eliminate as much of the work as possible the brace and bit can be used with a spring G under the valve to raise it. The screwdriver bit should have a teat or projecting point at its center, as indicated at C, Fig. 2, to keep the bit from working out of the slot. This teat is designed to fit into the center hole which will be found on almost all valves. The spring should be so large that it will fit over the end of the valve guide, and of sufficient tension to lift the valve and brace about $\frac{1}{8}$ to $\frac{1}{4}$ inch when the weight of the hand is lifted from the top of the brace. It is important that when a brace and bit is used it should not be revolved continually in one direction but should be worked back and forth a quarter to half a revolution at a time in just the same manner as if a screwdriver were employed.

2—It is claimed that the output of DeTamble cars for the season of 1912 will be

about 1,000, the same as made in 1912.

3—The big Fiat racer to which you refer is reputed to be the largest of its kind. It has a four-cylinder motor with a bore of 7.48 inches, a stroke of 9.84 inches; and each cylinder has two intake and two exhaust valves operated from an overhead camshaft. Motor Age has no more specifications on this model at present.

4—The armature shaft of the Bosch magneto is fitted with ball bearings at both ends, while the shaft carrying the distributor brush is fitted with plain bearings. The front bearing of the magneto should be lubricated once a week; this can be done by injecting a drop of oil in the reservoir marked Oil. On the distributor end plate two lubricating apertures are provided, one connected by a small tube to the ball bearings on the end of the armature shaft, and the other connected to the plain bearings on the distributor shaft. The common receptacle for these two bearings should be frequently filled, in order that the oil reservoir for the plain bearings may not run dry. No other part of the apparatus requires lubrication, and it must be borne in mind that the contact-breaker must not be lubricated. The bearings are self-lubricating, and this makes it impossible for oil to reach the contact points when the magneto is operating. Users are specially warned against the complete dismounting of the magneto, as all parts that need attention are so arranged as to be readily accessible. The dismounting will therefore serve no purpose; in addition, only those familiar with such apparatus will succeed in re-assembling it properly. From this it will be seen that lubrication is about all the attention the magneto requires.

5—S. A. E. is the abbreviation for Society of Automobile Engineers, the national motor car engineering body.

OIL GUN FILLS GREASE CUPS

NILES, Mich.—Editor Motor Age—The following suggestion may not be new to at least a part of the readers of Motor Age, but I have found it such a great help that I take the liberty of calling attention to the idea with the thought that at least some one who takes care of his car may find it of as great a convenience.

I have a Cadillac car which is well equipped with compression oil cups. The question of filling these cups has hereto-

Clearing House

Meaning of Toeing In and Camber of Wheels—Difference Between Three-Quarter Floating Rear Axles and Other Types—Overland Gear Ratio—Air Bottle Danger

fore been quite a little problem, as I never have found the plan of using a small wooden paddle for putting in hard oil very satisfactory, to say nothing of finding it very greasy and an unpleasant task. I now have gotten entirely away from this difficulty by cutting off about one-half of the stem of an ordinary oil gun, thus making the opening in the end of the stem much larger. This gun can be quite readily filled with hard oil either by pushing it into the gun or by removing the cap and drawing the grease into the gun in the way it is usually done with lighter grease. When the cap is replaced it will be found that the gun is the most convenient device possible for placing just the amount of hard oil desired in any one of the compression oil cups. By the use of an oil gun there is no trouble at all in filling them to exactly the right point, as shown in Fig. 1.—W. F. Harrah.

OVERLAND GEAR RATIO

Editor Motor Age—Please give the gear ratio of 1912 model T Overland 30 car of selective sliding gear type, on the different speeds.

2—Please explain what is, where is, and what is the purpose of, the thrust bearing of the master clutch of said model; and how often, and how this part should be oiled.

3—What are, where are, and what are the purposes of the valve stems and guides of the motor on this model; and how and how often should they be oiled; and how often should the sliding gear transmission be greased?—Mose Lathers.

1—The gear ratio of the bevel driving gear of the rear axle on the above mentioned car may be $3, \frac{3}{2}$ or 4 to 1, according to the desire of the purchaser. The change-speed gearset has ratios of approximately $3\frac{1}{2}$ to 1 on reverse speed; $2\frac{3}{7}$ to 1 on low-speed forward; $1\frac{1}{2}$ to 1 on intermediate, and is direct on the high speed. The entire gear ratio of the transmission from motor to wheels with a 3 to 1 rear axle would be: 3 to 1 on high speed, $4\frac{1}{2}$ to 1 on intermediate, and $5\frac{3}{7}$ to 1 on low speed; the motor, therefore, would make $5\frac{3}{7}$ revolutions to 1 of the wheels on low speed, etc.

2—The clutch thrust bearing on the Overland model above mentioned, is located between the male portion of the clutch and the flywheel which constitutes the female portion of the clutch. Its purpose is to resist thrust pressure created by

the clutch spring, and at the same time form a suitable bearing for the clutch when it is disengaged from contact with the flywheel. This bearing should be oiled about once a week with an oil can; access may be obtained to it between the spokes of the flywheel.

3—The valve stem of a valve is the long slender rod portion of the valve that passes through the valve guide, and supports the valve. Several types of valve-guides are shown in the May 23 issue of Motor Age, pages 24, 25, and 26. An even better idea of the location and arrangement of valves and guides may be obtained from the sectional drawing of a motor shown on page 42 of the same issue, the valves of the third cylinder being shown in section. The valves require no attention in the way of lubrication, as this is automatically taken care of, by means of a felt oil washer arrangement provided. The transmission gearset requires but little attention, a change and replenishment of the lubricant therein about twice a year being sufficient.

AIR-GAUGE A NECESSITY

Chicago, Ill.—Editor Motor Age—Inasmuch as a member of your own staff was a victim of the following accident, you might deem it valuable information for your readers. While inflating a tire with an air bottle, the rim, which may have been improperly secured, was broken and blown off. It struck the motorist with such force that he now is nursing a fractured arm, a cut forehead and a bruised leg. He neglected to use the gauge.—A. G. S.

Electric Lighting Systems

Some Features of These Different Outfits Explained—Difference in Axle Constructions

S. T. LOUIS, Mo.—Editor Motor Age—In the O'Neill lighting and starting system what is the gear ratio between the generator and the crankshaft; also, what are the dimensions of the generator?

2—What is the weight of the Delco electric lighting and starting system, and also of that used on the White cars, exclusive of the storage batteries?

3—Can the R. A. C. Handbook, announced in Motor Age, April 25, be obtained in the United States? If so, where, and at what price? Are there any other handbooks of foreign motor cars issued, and if so, where can they be obtained and at what price?

4—How does the three-quarter rear axle used on Michigan cars differ from the floating and semi-floating axles?

5—What is the difference in meaning of the expressions "toeing in" and "cambered," or do they mean the same thing?

6—Are there any speed records made by special electric motor cars? Which is the fastest electric stock car?

7—Have there ever been any official tests of the Darracq rotary valve motor?

8—What are the advantages and disadvantages of the set spark?—E. H. K.

1—Motor Age has not the data desired regarding the O'Neill electric lighting and starting system.

2—The Delco system weighs 110 pounds without the battery, this including two sets of ignition, battery and magneto, the lighting system, and self-cranking device. The battery weighs 65 pounds. The White system, it is claimed, weighs 150 pounds on the 30-horsepower car, and 165 on the 60-horsepower car.

3—No. It is obtainable from the Royal Automobile Club, London, England. No price is marked on the book, but most probably it costs between 25 and 50 cents. The Technical Publishing Co., Ltd., Lon-

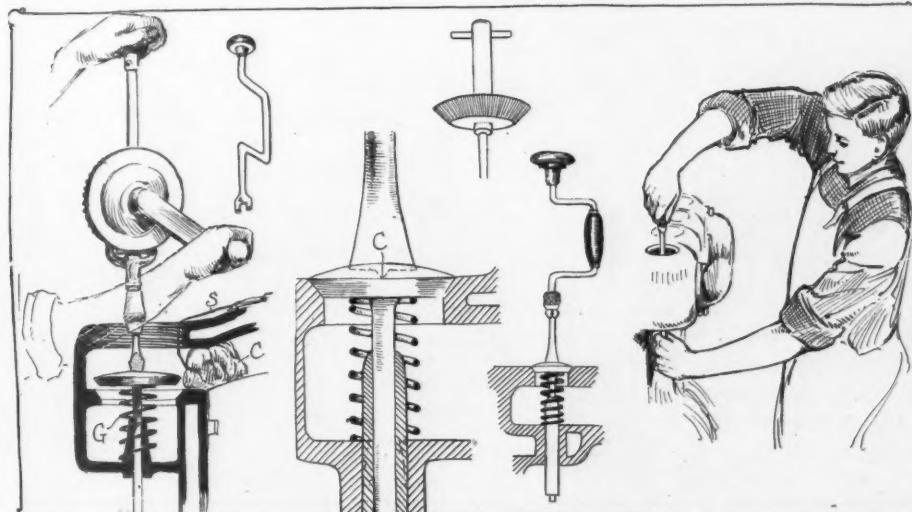


FIG. 2—MEANS AND METHODS OF GRINDING AND RESEATING MOTOR VALVES

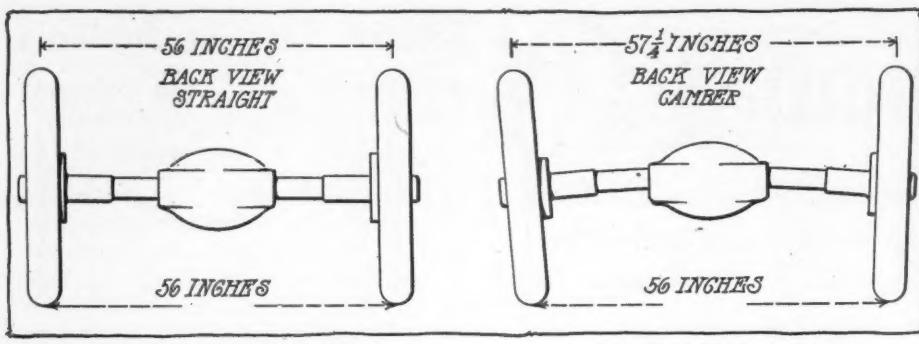


FIG. 3—STRAIGHT REAR AXLE

CAMBERED REAR AXLE

don, issues a book entitled "A List of Motor Cars, Manufactured or Sold in the United Kingdom, 1906-1912," compiled by W. C. Bersey; and there is another little book compiled by J. S. Critchley, entitled "British Motor Vehicles," 1912 edition, which is published by Charles D. Clayton, Ltd., London, England; the latter is priced 1 shilling, about 25 cents.

The only difference between the so-called three-quarter floating rear axle and the ordinary floating type lies in the rigid connecting of the ends of the transverse driveshafts to the wheel hubs, instead of having notched flanges on the ends of the shafts that fit loosely into similar notches in the outer edges of the wheel hubs. The differences between the three types—floating, three-quarter floating and semi-floating—is shown in Fig. 5. In the floating and three-quarter floating types, the wheels are mounted on the axle casing; and in the semi-floating type the wheels are mounted on the ends of the drive shafts. Thus in the floating and three-quarter floating types, the driveshafts are relieved of much weight carrying and road shocks. The Michigan axle is similar to the three-quarter axle shown in the illustration except that it has roller wheel bearings.

5—The expressions, camber and toe-in, are illustrated in Figs. 3 and 6; camber pertaining to the disposition of the wheels to converge toward the bottom, and toeing-in pertaining to the disposition of the front wheels to converge toward the front. Front wheels generally are adjusted so as

to toe-in from $\frac{1}{4}$ to $\frac{1}{2}$ inch; that is, they are set so that the distance between the felloes is from $\frac{1}{4}$ to $\frac{1}{2}$ inch closer together in front than behind.

6—The first road race in this country was held by the Automobile Club of America on Long Island, April 14, 1900, from Springfield to Babylon and return, a total of 50 miles, the winner being A. L. Riker, with an electric racer of 5 horsepower, which practically flew over the road. The time for the 50 miles was 2.03:30.

Nearly all of the prominent electric car manufacturers can give records of events in various parts of the country in which their respective products have been victorious over other prominent makes. Speed is not a factor in electric car operation, so no official electric race meets have been promoted.

7—Motor Age has no record of any official tests of the Darracq rotary valve motor.

8—The advantages of the fixed spark are simplicity of control, and less liability of damage to the motor through unskilled handling of the spark-control lever. There are no disadvantages except that perhaps a finer adjustment is possible with the spark control lever when operated by an expert.

As the speed of the motor increases, stronger electrical impulses are generated in the magneto; thus, even in fixed ignition, the gases are more quickly ignited, and ignition is automatically advanced.

Transmission Efficiency Comparison of Planetary, Sliding, and Friction Change-Speed Mechanism

C LARK, Mo.—Editor Motor Age—What per cent. of the power is delivered to the rear wheels of a car using friction transmission, planetary transmission and sliding gear transmission? Or, in other words, which type of transmission delivers the power with the least loss?

2—Please give the advantages and disadvantages, if any, of a long-stroke motor.—W. E. Brown.

1—On direct drive, the loss in efficiency chargeable to a sliding gearset is only that due to friction of the bearings; for in most sliding gearsets the secondary shaft is stationary. The efficiency loss in a pair of bearings is given by Beaumont as 5 per cent. The efficiency of friction transmission is an uncertain factor, for it varies with the kind and condition of the surfaces, the pressure applied, the speed and size of disks and the power transmitted. An efficiency of 70 per cent. is not far from the average, although 85 per cent. is claimed for some types. Planetary transmission is credited with approximately 75 per cent. efficiency by Beaumont. In none of these is the loss in the final drive considered.

As to the advantage of the long stroke from a standpoint of general economy and wearing qualities, there can be no question, and the short-stroke motor is decidedly in the advantage when the question of weight is considered. Whether or not a long-stroke motor or one of a short stroke is preferable, depends to a great extent upon the use to which the motor is to be put. In motor car service the long-stroke motor is particularly adapted for commercial cars, on which its increased weight and size is of little consequence, while its greater fuel economy and increased lease of life are valuable features. The compression chamber of a long-stroke motor is more compact than in a short-stroke motor, thus assuring greater thermal efficiency.

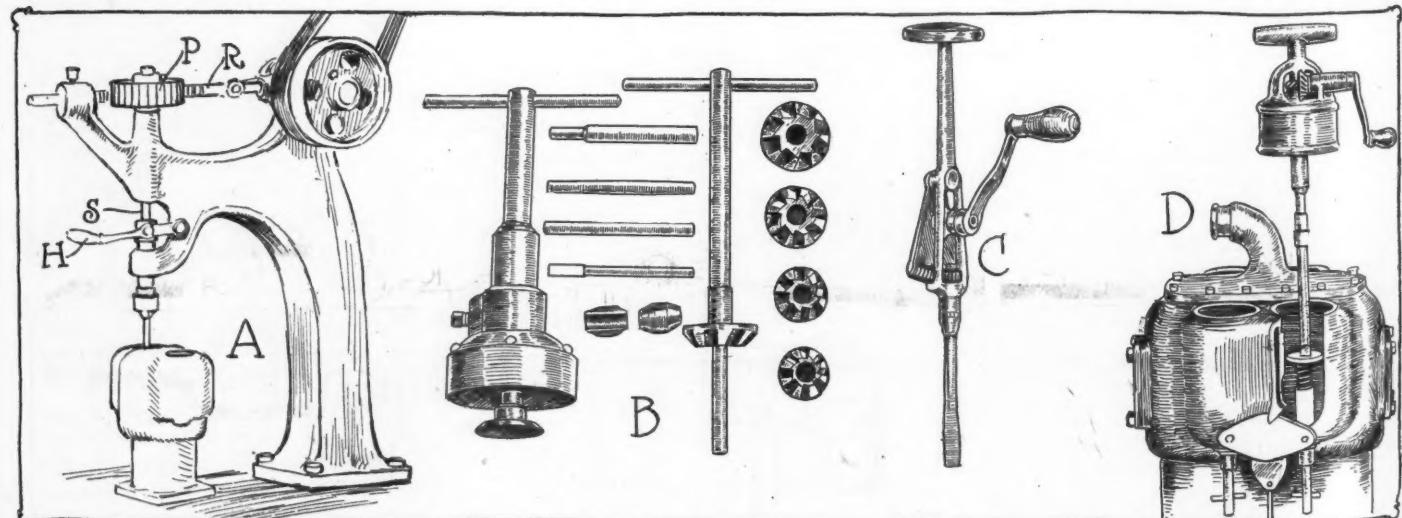


FIG. 4—SPECIAL TOOLS DESIGNED TO FACILITATE THE OPERATION OF RESEATING MOTOR CAR ENGINE VALVES

Maximum Load on Ford

750 Pounds is Limit For Which Car Was Designed—Will Probably Carry More

JASPER, Mich.—Editor Motor Age—I have a Ford T five-passenger car. What would be the maximum weight in pounds that could be carried without injuring the car if traveling over smooth roads?

2—When I first got the car it leaked compression around the spark plugs. I tightened the gaskets as much as they would stand and they still leak a little. Is it advisable to put a washer of asbestos around the gaskets and then tighten it up again?

3—I have had a little trouble with cooling the engine as the water in the radiator will boil when the car has been run only 3 miles on high speed. Is this caused from poor circulation of water or something of a foreign nature in the radiator? I usually drive from 15 to 20 miles an hour and keep plenty of oil in the crankcase.—Amateur.

1—Your car is designed to carry a maximum load of about 750 pounds; it is reasonable to believe that it will carry 900 pounds over smooth roads without putting too severe a strain upon it but Motor Age would advise keeping well within the maximum if you desire the service that the company claims for the car.

2—It would be advisable to repack the plugs with asbestos washers obtainable from almost any motor car supply house, or to fit new plugs, and keep the old set for emergencies.

3—If the Ford radiator is filled to the top of the filler pipe, after about 3 miles running as you state, the expansion due to the heat will have forced some of the water out of the radiator, but after this no more of the water should be lost unless there is something wrong with the circulating system that causes the water to boil and evaporate quickly in the form of steam. If the radiator does not steam, and the motor shows no loss of power, do not worry over the trouble.

If you think the circulation is poor, dissolve 2 pounds of crystals of soda in each gallon of water contained in the cool-

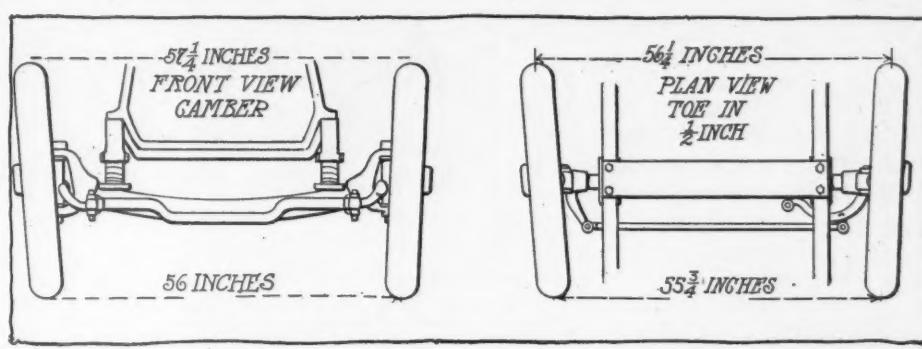


FIG. 6—CAMBERED FRONT WHEELS

TOEING-IN FRONT WHEELS

ing system of your motor. Put this solution in the cooling system; let the motor run for a few minutes so that the solution is well distributed throughout the entire system; let it stand over night; then flush out thoroughly in the morning with clear water. When flushing out a radiator, see that there is an unobstructed flow of water through it. It often is beneficial to reverse the flow of water through the radiator in flushing it out, because often there are little scales of lime jammed in parts of the radiator which cannot be dislodged in one direction, but which will loosen up very readily when the flow of water is reversed. The flow of water may be reversed through the radiator by simply arranging the hose from the hydrant so that the water is forced in at the lower radiator connection instead of at the top.

HAS TIMER TROUBLE

MULLINVILLE, Kans.—Editor Motor Age—What is the trouble with my two-cylinder, opposed, air-cooled International motor wagon which is fitted with a Leavitt timer. It skips and sometimes stops firing entirely while running along nicely. If I work the spark lever quickly it seems to shake the timer and starts it to work at once. What is the remedy for this difficulty?—William A. Cope.

Your trouble seems to be due either to a loose wire connection, or to a loose, worn timer. To test for a loose wire connection, start the motor and while running regularly without misfiring, take hold of each wire one at a time, and wiggle it. Should you get hold of a loose one the motor will start to misfire immediately or stop entirely. If the timer is loose you may remedy the trouble by removing the

timer and placing a washer under it to steady it in its operation; the roller then will not be apt to make poor contact. The timer should be oiled occasionally to reduce wear, and should be kept clean of everything but oil. It is well to clean it up once in a while with gasoline, then when dry oil it thoroughly. If the timer is badly worn it might be advisable to have a new timer fitted.

INFORMATION WANTED

CHILlicothe, Mo.—Editor Motor Age—I would like to know how to make a blower to blow a horn or whistle. I have a 6-volt motor, and I thought I could connect it directly with a small blower and have a tube leading to my horn. I could have a push button on the steering wheel. Please give me instructions, and sketch, if possible, how I could make this.—William C. Hogel.

Your scheme could be worked out very easily if a suitable blower could be obtained; and being at a loss for information regarding such a blower, Motor Age appeals to its readers for assistance in this regard.

MAKING NEW PISTON RING

ORDWAY, Col.—Editor Motor Age—In making a new piston ring for a cylinder of, say, 4-inch base, how much larger in outside diameter should the ring be—before it is split—than the base of the cylinder?—Investigator.

1—A piston ring for a 4-inch cylinder should be about $4\frac{1}{8}$ inches in diameter before being split; and after it has been split there should be from 8 to $15/1000$ -inch space between the ends when the ring is tried in the cylinder.

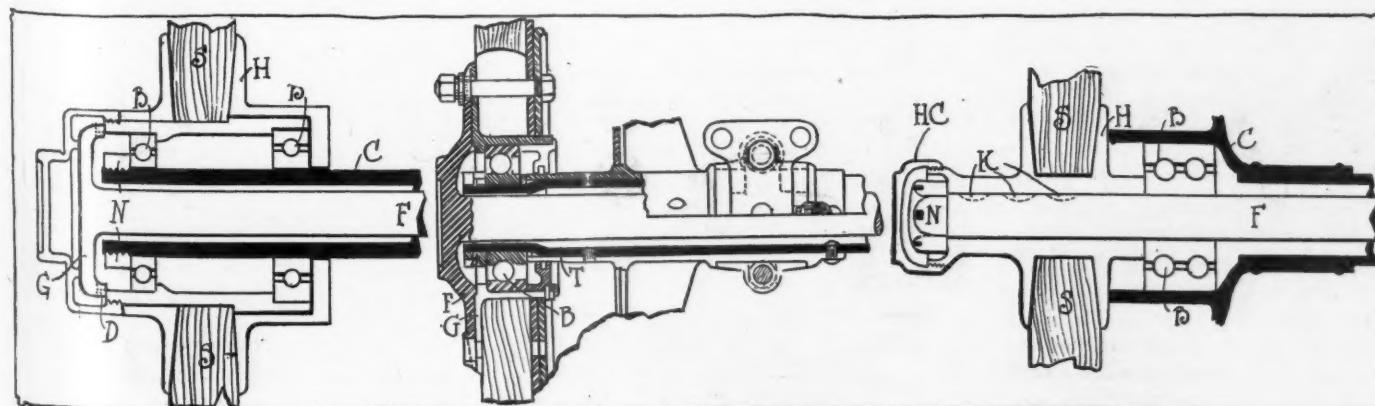


FIG. 5—FLOATING AXLE

THREE-QUARTER FLOATING AXLE

SEMI-FLOATING AXLE

<i>Foreign Lubricating Systems</i>	
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SPLASH AND PRESSURE.....	16
HIGHEST OIL PRESSURE, LBS..	40
MEDIUM OIL PRESSURE, LBS..	20
LOWEST OIL PRESSURE, LBS..	10

Lubrication Characteristics

USE OF BAFFLE PLATES
OIL PUMP INSIDE CRANKCASE
INTERNAL OIL LEADS
NO SIGHT FEEDS; ONLY PRESSURE
INDICATOR ON DASH NEEDED
GEAR OIL PUMP POPULAR
CRANKSHAFT OILWAYS 2, 3 AND
5-MILLIMETER DIAMETER
LARGER OIL RESERVOIRS
ADDITIONAL TANK ON CHASSIS

By W. F. Bradley

A COUNT of the latest types of cars produced by European manufacturers shows a decided preference for forced-feed lubrication to all parts of the motor. Out of 246 types of cars manufactured by eighty-three makers in France, England, Germany, Belgium and Italy, 134 of these have forced-feed lubrication. By this term is meant oil delivered under pressure to the main crankshaft bearings and through oilways in the crankshaft to the connecting rod ends, with in some cases a delivery of oil up the hollow crankshaft to the wrist pin.

Some of the Systems

The next most popular system is that of troughs in which a constant level is maintained by means of a pump; these are forty in number.

Delivery of oil under pressure to the main crankshaft bearings only, with troughs for the connecting rod ends, is found on thirty-one cars.

On twenty-five models the simple splash method is relied upon.

On sixteen there is pressure feed to the main bearings and splash for other parts.

Considering French makers only, the preference for forced-feed lubrication is even more pronounced, the following twenty-seven firms using this method of lubricating their motors either on all or some of their models: Aleyon, Bazelaire, Bozier, Berliet, Chenard-Walcker, Chapuis-Dornier, Darracq, Delage, Delaunay-Belleville, Delahaye, de Dion-Bouton, D. F. P., F. L., Gregoire, Harlé, Hispano-Suiza, Hotchkiss, Labor, Motobloc, Panhard-Levassor, Picard-Pictet, Rolland-Pilain, Sizaire-Naudin, Saurer, Schneider, Unic and Vinot-Deguingand.

As Europe Lubricates

Count Taken Shows Forced Feed System Most Popular Among Foreign Car Manufacturers

Discussion of Characteristic Types

One French Maker Has Oil Radiator Which Cools Lubricant, Then Sends It Back to the Sump

Although the great majority of European manufacturers appear to be convinced of the superiority of the forced-feed system, there is no uniformity in the methods of its application. The claims made for it are that the high pressure of oil diminishes the wear of the surfaces in contact, that there is not any adjustment necessary or possible on the part of the driver, and that when properly established it diminishes the danger of carbon deposit and the possibility of a smoky exhaust.

Some of the Tendencies

Tendencies are more and more towards a big quantity of oil and a high pressure. In some cases a pressure as high as 40 pounds per square inch is maintained, but in the great majority of cases the pressure does not exceed 20 pounds and very often is maintained at not more than 10 pounds. Delaunay-Belleville, Rolls-Royce, Hispano-Suiza, Sautter-Harlé, are some of the firms making use of a high pressure and a delivery of oil either through the hollow connecting rod or up an oil pipe in the channel of the connecting rod to the wrist pin. Probably the only reason why this is not adopted more generally is because of cost, for the only objection that can be raised, namely the danger of a smoky exhaust, can be overcome by fitting suitable baffle plates at the base of the cylinders. Delaunay-Belleville, on its latest models, puts the baffle plate a little distance below the bottom of the cylinder, thus forming an independent chamber between the cylinders and the main portion of the crankcase, this position diminishing the possibility of oil working up into the combustion chambers.

In most cases the pump is carried within the crankcase, driven either off the middle or the rear end of the camshaft, or in some cases, as on the new Hotchkiss models, off the crankshaft. With a view to ease of inspection it is sometimes placed on the outside of the crankcase, and the oil leads are made external, but as public opinion is strongly in favor of a clean

motor, designers have to abandon whatever advantage there may be in this method and place the pump inside with all oil pipes cast or fitted internally. This is an arrangement which appeals strongly to the European public, which is of the opinion that only the pressure indicator should be present as an indication that there is an oiling system.

It is a somewhat curious fact that while some European designers claim to have met with considerable difficulties in forcing oil through a long crankshaft, owing to centrifugal force arresting the flow of the oil, others are of the opinion that this trouble does not exist. Hotchkiss, for instance, sends a flow of oil direct from the rear to the front end of the crankshaft of a big four-cylinder motor, and declares that no difficulty has been experienced in obtaining a sufficiency of oil at the front bearings. Delaunay-Belleville, on the other hand, has external, curved oil pipes on the webs of the six-cylinder crankshaft the curve of the pipe being calculated to overcome the effects of centrifugal force.

Chenard-Walcker System

Chenard-Walcker, with a four-cylinder motor having a two-bearing crankshaft, carries the oil to the two central connectingrod ends through semi-circular aluminum casing bolted to each web of the crankshaft. In the majority of cases the four-cylinder motors have three-bearing shafts, and a straight line course is adopted from the main bearing to the adjacent connecting rod bearings, the center main bearing having to feed two connecting rods, while the two end ones each pass the oil through to one only. European designers vary considerably in their ideas on the diameter of oil ways in bored crankshafts, the sizes varying from 2 or 3 millimeters to as high as .5 millimeters. The gear wheel pump is by far the most commonly used, the plunger type of pump having two notable exponents in Delaunay-Belleville and Hotchkiss.

The size of pumps has enormously increased of late in order to give the motor a big supply of oil, this increase sometimes diminishing the ground clearance of the car in a manner that would not be advisable for other than European road conditions. To assist in cooling the oil,



crankcases now are often ribbed, but of course the best effect is only obtained when there is no under pan, and with this protection removed the value of the ribs often is diminished by layers of mud.

Oil Radiator Used

One French maker has adopted a system of oil radiator immediately behind the water radiator, the oil being carried up to this radiator to be cooled and then back again to the sump. Up to the present the plan has been only used on the firm's racing cars, and owing to the extra complication it is not known whether it will be applied to the touring models. The big sump lessens the intervals at which the motor has to be supplied with oil, but in the opinion of users this is not sufficient, and endeavors are being made to make the replenishing of the sump entirely automatic. The Delaunay-Belleville method is to carry a reserve supply of oil in a tank within the chassis and to shoot an additional supply to the motor as desired by means of a foot-operated plunger pump.

There are several modifications of this system on cars of European construction. Hispano-Suiza has made the replenishing entirely automatic by carrying an auxiliary oil tank on the outside of the frame and connecting it to the sump through a float chamber attached to the crankcase. As long as there is oil in the reserve tank a correct working level will be maintained



in the motor, and in no case is it necessary to lift the bonnet in order to renew the oil supply. Chenard-Walcker has adopted the principle of the inverted bottle in maintaining a constant level of oil in the base of the crankchamber. The reserve supply of oil is in a tank on the dashboard, and from this tank a pipe descends into the crankchamber, its lower end being set at the level of oil to be maintained. While the extremity of the pipe is immersed in oil, no flow will take place from the tank, but as soon as the level in the base descends until the pipe is uncovered oil will begin to flow until the level is again established.

In order to prevent an emptying of the tank as soon as the filler cap is removed, a tap is fitted on the feed pipe and is closed when filling up. A glass face being set in the tank, the driver is always aware of the quantity of oil held in reserve. With this system there is no necessity for a pressure indicator, it being assumed that the pump will not get out of order and the glass face in the tank always indicating the amount of oil available.

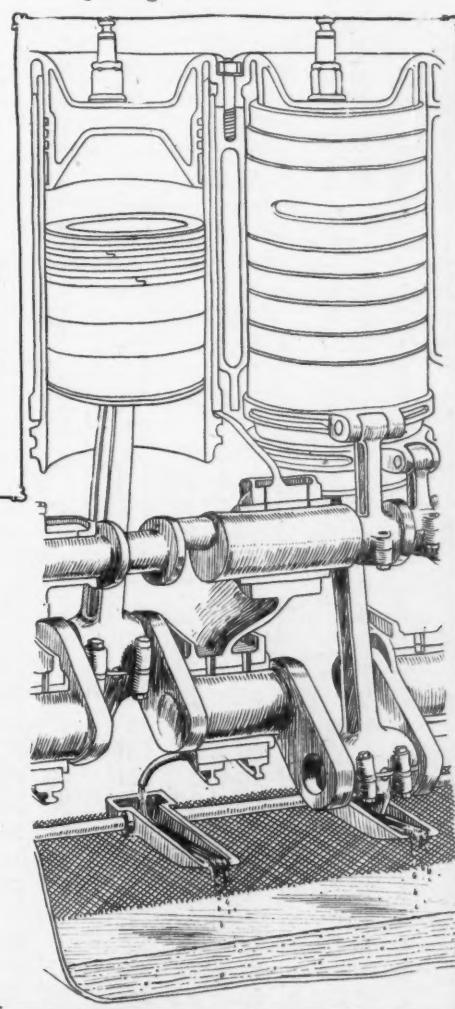
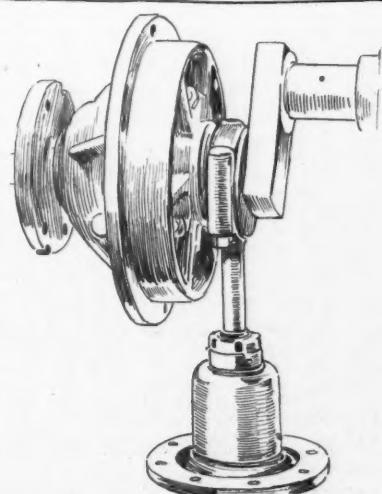
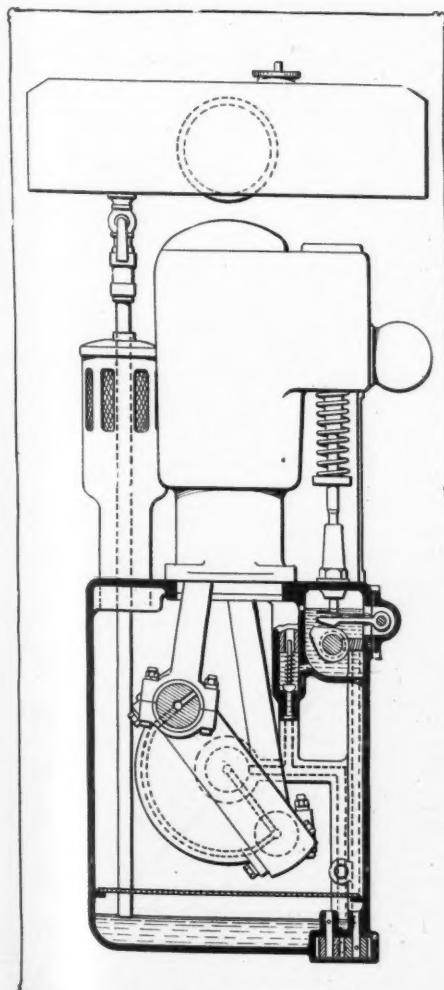
Pressure Indicator on Dash

Most makers fit a pressure indicator on the dashboard as a control of the lubricating system. On the Sautter-Harlé cars an additional control is provided by a small aluminum tank bolted to one side of the motor. The oil is pumped up from the base to this tank, then driven out under pressure to the two end bearings and through the hollow shaft to the connecting rod ends. As a glass tube is set in the tank the flow of oil always can be verified, while there is a further control by unscrewing the cap in the top of the tank and watching the oil come in through the feed pipe. It is claimed that this arrangement tends to keep the oil at an even temperature, warming it in cold weather

and tending to cool it under hot weather conditions. With the use of the filler cap on the top of the tank it is possible to allow an initial quantity of oil to flow by gravity to the main bearings if the motor has been standing idle for a considerable length of time. Probably a certain amount of damage is done to the bearings of motors in the interval between starting up and the time the pressure fed oil gets round to them. A disadvantage of this auxiliary tank on the motor is that it entails external piping.

Plunger Instead of Indicator

In place of the usual pressure indicator one maker has endeavored to make use of a small plunger to which a flexible wire is attached, the outer end of the wire being brought up to the steering wheel and fitted with a knob. While pressure is maintained in the feed pipe, the plunger is raised and the end of the cable with its knob projects from the casing. Thus there is no necessity to have a light in order to control the lubrication. It is a somewhat difficult matter, however, to obtain a plunger which will not allow oil to pass out. Another method adopted on a car of French construction consists in bringing the oil to the dashboard through an inverted U sight feed. The actual flow of the oil can be observed and at night time the feel of the glass will indicate whether oil is passing or not.



CHENARD-WALCKER OIL SYSTEM—HOTCHKISS PLUNGER PUMP—EXAMPLE OF TROUGH OILING SYSTEM



The Mathematics of Motoring

SPEED fans in general and particularly those attending the 500-mile sweepstakes race at Indianapolis will be interested in the table on this page and the charts on the opposite one, by which the speed of any car for any number of laps of the speedway track may be found. Last week the method of figuring the speed for any distance in any time was explained, but for the Indianapolis race the chart and table is arranged so no calculation is necessary.

The table below gives the time required to make 1, 4, 20, 40, 80, 120, 160, or 200 laps at speeds from 70 to 90 miles per hour, for any number of laps. Select the column headed by the number of laps and

Speeds in 500-Mile Race

in it find the nearest time in hours, minutes and seconds; opposite this in the right-hand column will be found the speed corresponding to that time. For instance, to find the speed of a car that makes one lap in 2 minutes 5 seconds, take the first column, headed "1 Lap" and drop to the fifth line reading 2:05.0; opposite this in the last column is 72 miles per hour.

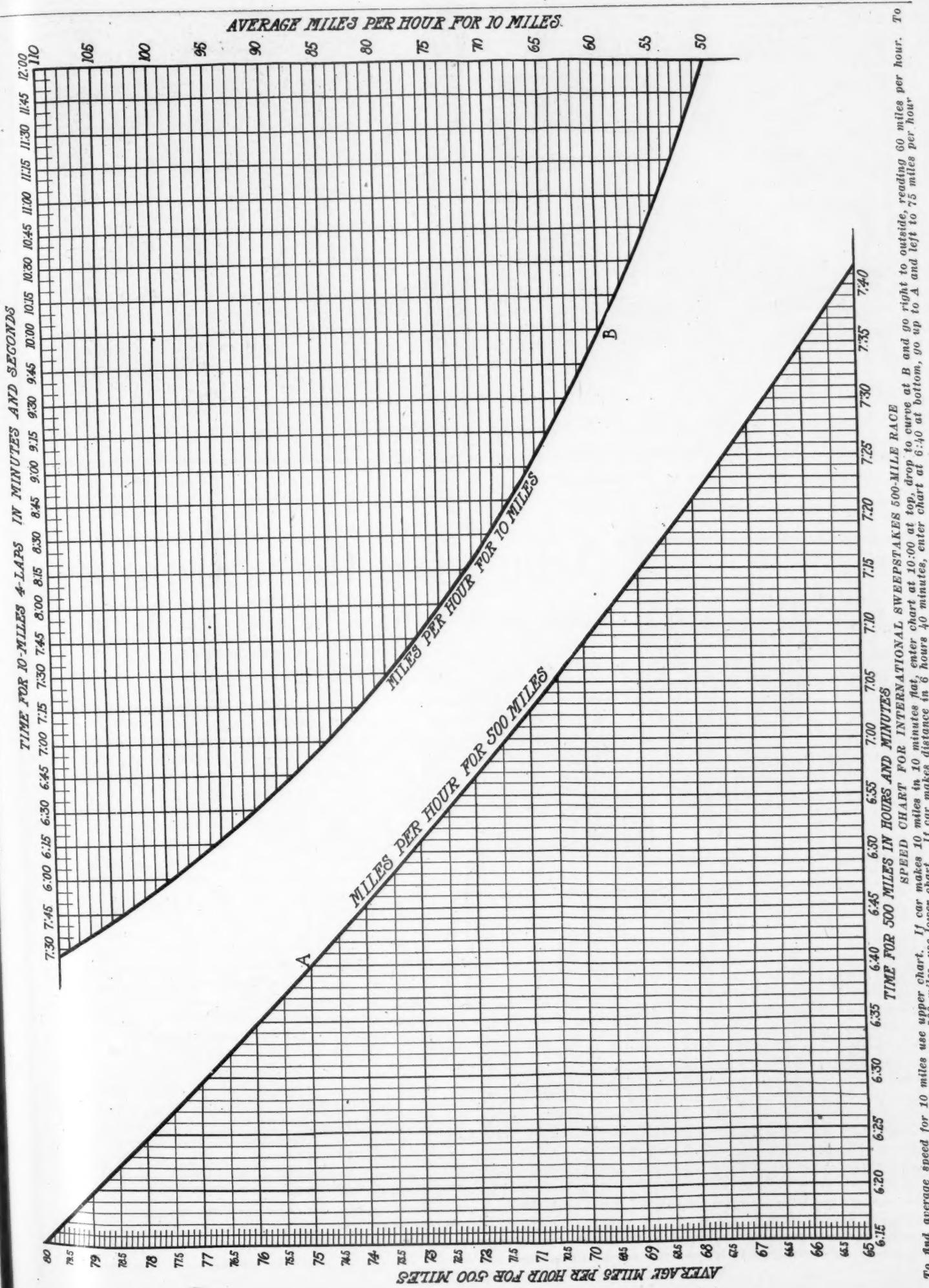
More accurate figures of the speed for distances of 10 miles, four laps, and 500 miles will be found on the opposite page.

To find average speed in miles per hour for 10 miles, use upper chart as follows:

On vertical line corresponding to the time for 10 miles as marked at top of chart, drop down to curve; where curve intersects vertical line follow horizontal line right to figures representing miles per hour. Suppose car makes 4 laps in 10 minutes flat; enter chart at 10:00 at top, drop to curve at B and go right to outside, reading 60 miles per hour.

For whole race use bottom chart: On vertical line corresponding to time as marked at bottom, go up on vertical line to curve; where it intersects vertical line, go left to miles per hour. Suppose car makes distance in 6 hours 40 minutes; enter chart at 6:40 at bottom, go up to A and go left to 75 miles per hour.

SPEED IN MILES PER HOUR FOR 2½ MILE TRACK.																			
1 Lap 2½ M.		4 Laps 10 Miles		20 Laps 50 M.		40 Laps 100 Miles		80 Laps 200 Miles		120 Laps 300 Miles		160 Laps 400 Miles		200 Laps 500 Miles		MILES PER HOUR			
Min.	Sec.	Min.	Sec.	Min.	Sec.	Hr.	Min.	Sec.	Hr.	Min.	Sec.	Hr.	Min.	Sec.	Hr.	Min.	Sec.		
2	08.6	8	34.4	42	52	1	25	44	2	51	28	4	18	12	5	42	56	7 08 40	70
2	07.6	8	30.4	42	32	1	25	04	2	50	08	4	15	12	5	40	16	7 05 20	½
2	06.8	8	27.2	42	16	1	24	32	2	49	04	4	13	36	5	38	08	7 02 40	71
2	05.8	8	23.2	41	56	1	23	52	2	47	44	4	11	36	5	35	28	6 59 20	½
2	05.0	8	20.0	41	40	1	23	20	2	46	40	4	09	00	5	33	20	6 56 40	72
2	04.2	8	16.8	41	24	1	22	48	2	45	36	4	08	24	5	31	12	6 54 00	½
2	03.4	8	13.6	41	08	1	22	16	2	44	32	4	06	48	5	29	04	6 51 20	73
2	02.4	8	09.6	40	48	1	21	36	2	43	12	4	04	48	5	26	24	6 48 00	½
2	01.6	8	06.4	40	32	1	21	04	2	42	08	4	03	12	5	24	16	6 45 20	74
2	00.8	8	03.2	40	15	1	20	30	2	41	00	4	01	30	5	22	00	6 42 30	½
2	00.0	8	00.0	40	00	1	20	00	2	40	00	4	00	00	5	20	00	6 40 00	75
1	59.2	7	56.8	39	44	1	19	28	2	38	56	3	58	24	5	17	52	6 37 20	½
1	58.4	7	53.6	39	28	1	18	56	2	37	52	3	56	48	5	15	44	6 34 40	76
1	57.6	7	50.4	39	12	1	18	24	2	36	48	3	55	12	5	13	36	6 32 00	½
1	56.8	7	47.2	38	56	1	17	52	2	35	44	3	53	36	5	11	28	6 29 20	77
1	56.0	7	44.0	38	40	1	17	20	2	34	40	3	52	00	5	09	20	6 26 40	½
1	55.4	7	41.6	38	28	1	16	56	2	33	52	3	50	48	5	07	44	6 24 40	78
1	54.6	7	38.4	38	12	1	16	24	2	32	48	3	49	12	5	05	36	6 22 00	½
1	53.8	7	35.2	37	56	1	15	52	2	31	44	3	47	36	5	03	28	6 19 20	79
1	53.2	7	32.8	37	44	1	15	28	2	30	56	3	46	24	5	01	52	6 17 20	½
1	52.4	7	29.6	37	28	1	14	56	2	29	52	3	44	48	4	59	44	6 14 40	80
1	51.8	7	27.2	37	16	1	14	32	2	29	04	3	43	36	4	58	08	6 12 40	½
1	51.2	7	24.8	37	04	1	14	08	2	28	16	3	42	24	4	56	32	6 10 40	81
1	50.4	7	21.6	36	48	1	13	36	2	27	12	3	40	48	4	54	24	6 08 00	½
1	49.6	7	18.4	36	32	1	13	04	2	26	08	3	39	12	4	52	16	6 05 20	82
1	49.0	7	16.0	36	20	1	12	40	2	25	20	3	38	00	4	50	40	6 03 20	½
1	48.4	7	13.6	36	08	1	12	16	2	24	32	3	36	48	4	49	04	6 01 20	83
1	47.8	7	11.2	35	56	1	11	52	2	23	44	3	35	36	4	47	28	5 59 20	½
1	47.2	7	08.8	35	44	1	11	28	2	22	56	3	34	24	4	45	52	5 57 20	84
1	46.6	7	06.4	35	30	1	11	00	2	22	00	3	33	00	4	44	00	5 55 00	½
1	45.8	7	03.2	35	16	1	10	32	2	21	04	3	31	36	4	42	08	5 52 40	85
1	45.2	7	00.8	35	04	1	10	08	2	20	16	3	30	24	4	40	32	5 50 40	½
1	44.6	6	58.4	34	52	1	09	44	2	19	28	3	39	12	4	38	56	5 48 40	86
1	44.0	6	56.0	34	40	1	09	20	2	18	40	3	28	00	4	37	20	5 46 40	½
1	43.4	6	53.6	34	28	1	08	56	2	17	52	3	26	48	4	35	44	5 44 40	87
1	42.8	6	51.2	34	16	1	08	32	2	17	04	3	35	36	4	34	08	5 42 40	½
1	42.2	6	48.8	34	04	1	08	08	2	16	16	3	24	24	4	32	32	5 40 40	88
1	41.6	6	46.4	33	52	1	07	44	2	15	28	3	23	12	4	30	56	5 38 40	½
1	41.2	6	44.8	33	44	1	07	28	2	14	56	3	22	21	4	29	52	5 37 20	89
1	40.6	6	42.4	33	32	1	07	04	2	14	08	3	21	12	4	28	16	5 35 20	½
1	40.0	6	40.0	33	20	1	06	40	2	13	20	3	20	00	4	26	40	5 33 20	90



To find average speed for 10 miles use upper chart. If car makes 10 miles in 10 minutes flat, enter chart at 10:00 at top, drop to curve at B and go right to outside, reading 60 miles per hour. To find average speed for race, 500 miles, use lower chart. If car makes distance in 6 hours 40 minutes, enter chart at 6:40 at bottom, go up to A and left to 75 miles per hour.

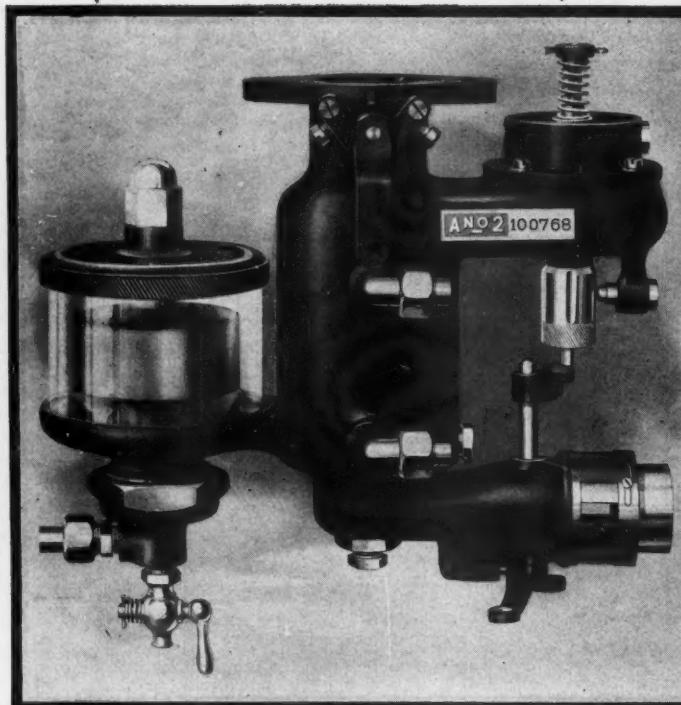


FIG. 1—THE PIONEER STROMBERG MODEL
This is the present evolution of the original Stromberg. It is a single-jet or nozzle type and uses a glass float chamber

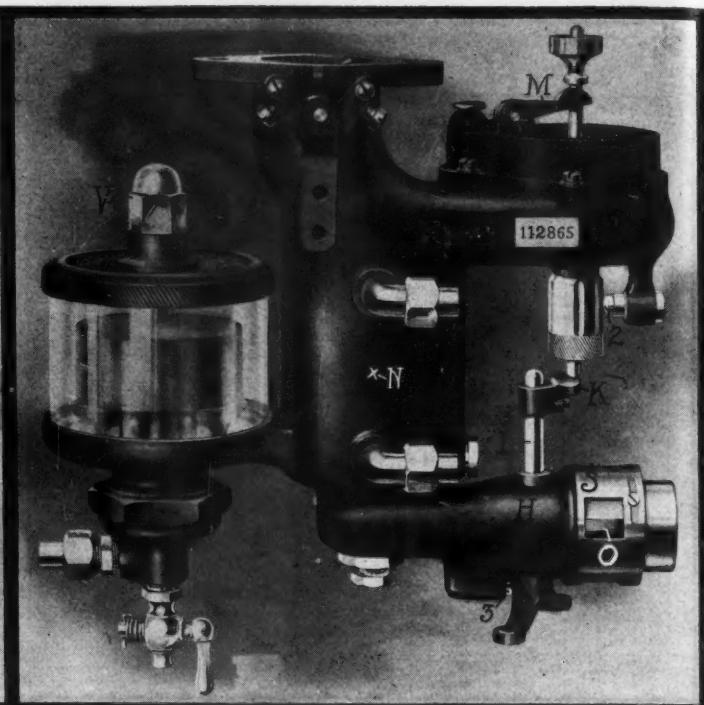


FIG. 2—THE DOUBLE-JET STROMBERG TYPE
This is the latest Stromberg creation; a two-nozzle design for six-cylinder cars or those with large four-cylinder motors

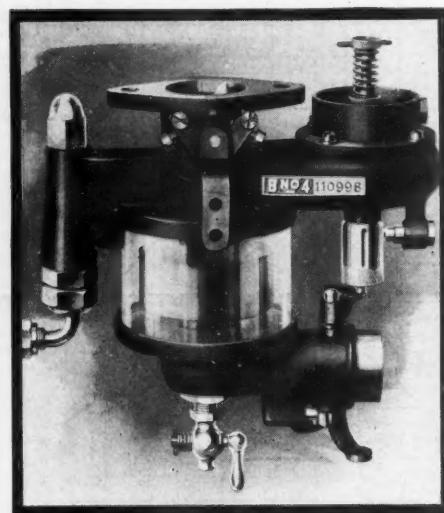


FIG. 3—STROMBERG MODEL B
This carburetor is for small air-cooled motors and others with thermo-syphon water circulation. It has no hot-water jacket

THE carburetor, being one of the easiest parts of a motor to adjust and tamper with when the engine misses or in any wise acts cantankerously, is it any wonder that if an occasional miss occurs in one of the cylinders, if overheating symptoms present themselves, if there is lack of power on any speed, that a few turns are given the adjustment on the auxiliary air valve, or the float level, or the spraying nozzle or any other part that is susceptible to adjustment. It is but natural these are the simplest parts to reach.

It is much easier to change the spring tension on an auxiliary air valve than it is to remove a spark plug to see if the insulation is cracked or if the sparking points are too far apart. It is generally

Adjusting the Stromberg Modus Operandi by Which Carburetors May Be Tuned Up —Process of Manufacture

much easier to give the needle valve in the spraying nozzle a turn, than it is to look for short circuits in the electric wiring; or to test if there is poor compression due to a valve not seating and so causing periodic missing; or to investigate if the battery is weak; or to go over the essentials of a magneto; or to discern if enough oil is being fed to the motor; or a score of other causes that may be the cause of the lack of power, heating of the motor and cylinders missing occasionally or periodically.

It is essential, however, for a driver to know the mechanical details of his carburetor, to know the modus operandi, to know how to adjust, where adjustments must be made, and to try to learn when a motor trouble is occasioned by a disordered carburetor, and when by ignition faults, lubrication troubles, and refrigeration.

The 1912 Strombergs

In the 1912 line of Stromberg carburetors there are three models; each is intended for a particular type of motor, and each is designed for such. In all three the basic principles of operation are alike, and while they differ in details their troubles are similar and their cures the same. The three models for the present season are officially labeled:

Model A, for four-cylinder water-cooled motors with positive water circulation through the cylinder jackets by pump. This is the pioneer Stromberg model and was put on the market approximately 5 years ago. Fig. 1.

Model B, is for air-cooled motors or water-cooled types in which water circulation is by thermo-syphon means. It is a concentric type of carburetor, Fig. 3, and is intended for motors with horsepower up to 30.

Model C is the latest one, is for six-cylinder motors, or very large four-cylinder types, and differs from A and B in that it has two spraying nozzles, a main nozzle within the casing at N Fig. 2 and an auxiliary nozzle at N 1, the latter operated by the auxiliary air valve.

Before proceeding to the necessary details in adjustment of these models a general conception of how they are designed and how they operate is essential. Figs. 4 and 5 show this. Fig. 4 shows model C with its two nozzles N and N1, and the illustration explains model A by eliminating the auxiliary N1. Fig. 5 shows model B for air-cooled or thermo-syphon motors.

In all three the gasoline system is regulated by a hollow copper float F, which through two pivoted levers, raises or lowers the needle valve for regulating the

flow of gasoline from the gasoline tank. In the illustration the valve is raised to allow gasoline to enter by way of the connection U, and through the filter screen G2, carried in the universal coupling G. By means of a locking nut G1, this coupling can be set at any angle, making it readily adaptable to all motors.

The float so regulates the gasoline level that it rises to 3/16 inch below the top of the nozzle N. This is enough leeway to prevent overflowing from the nozzle, which would result in what is known as flooding, or too much gasoline.

No Controlling Needle

The nozzle N is without any controlling needle valve. The nozzle is merely a short vertical pipe with a narrowed orifice at the top. Nozzles in different sizes of carburetors have different diameter of orifice. A 1 1/4-inch carburetor, which is the popular size and suitable for a four-cylinder motor ranging in size between 3-inch bore, 4-inch stroke and 4-inch bore and stroke, uses a 59-gauge nozzle, but the buyer is also given two additional nozzles, one 58-gauge which is a little larger than the 59, and also a 60-gauge which is a little smaller. Some conception of the diameter of orifice in these nozzles can be gained by knowing that a 72-gauge opening equals .00049 inch, and a 48-gauge one equals .00454 inch. The former is the smallest size nozzle used and the latter the largest. With every different carburetor model and every different size three nozzle sizes are given. A 1-inch size takes a 62 as standard with 61 and 63 as over and under sizes. The reader must remember that the smaller the number designating a certain

gauge the larger is the orifice diameter. On the 1.5-inch sizes 55.5 is standard with 54 and 56 as extras.

Glass Float Chamber

The use of a glass float chamber on all three models makes it an easy job to see the level of gasoline in the float chamber and as a checkup on the correct level, a horizontal line is scratched on the body part of the carburetor this line marking the proper level of the fuel in the nozzle. The level on the float chamber should check up with this mark, if not a variation of 1/16 inch above or below the line is permitted but variations beyond this limit call for a change of float level, an easy task.

The float level is varied as follows: Fig. 6 a section of a float chamber shows how the float F rests on the two levers F1 and how these in turn are pivoted on the block F2 so that the inner ends bear upwards against the sleeve V1, which sleeve carries the needle valve V. As the float comes down, due to lack of gasoline the needle valve goes up, as illustrated, and allows more fuel to enter. The upward movement of the sleeve V1 is retarded by a coil spring V3 and just as the tension of this spring is increased or reduced so the work required to lift the needle valve is changed. The spring tension can be varied by removing the acorn-shaped cover V5 and turning down the adjusting nut V4. Turning the nut down increases the spring tension and so lowers the float level and also lowers the level of the gasoline in the nozzle. Turning the adjusting nut up raises the float level and also the gasoline level in the nozzle. This is the only con-

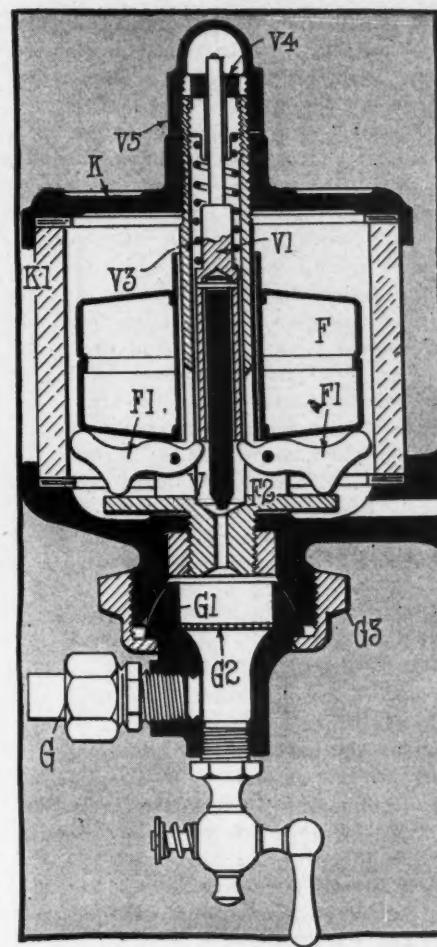


FIG. 6—STROMBERG FLOAT CHAMBER

The parts are: F, copper float; F1, float levers; F2, support; V, needle valve; V3, spring; V4, adjusting nut; V5, nut cover; K1, float chamber glass; G1, universal union; G, coupling; G2, lock nut; G3, strainer

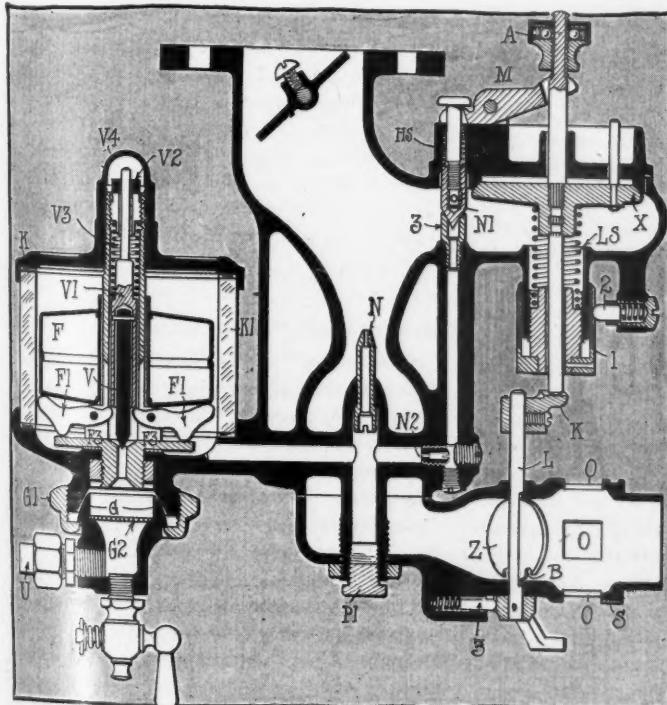


FIG. 4—STROMBERG CARBURETER, MODEL C

This is a double-jet carburetor intended for six-cylinder motors or large sizes of four-cylinder designs. The secondary nozzle is regulated by a governing needle, N1, interconnected with the auxiliary air valve

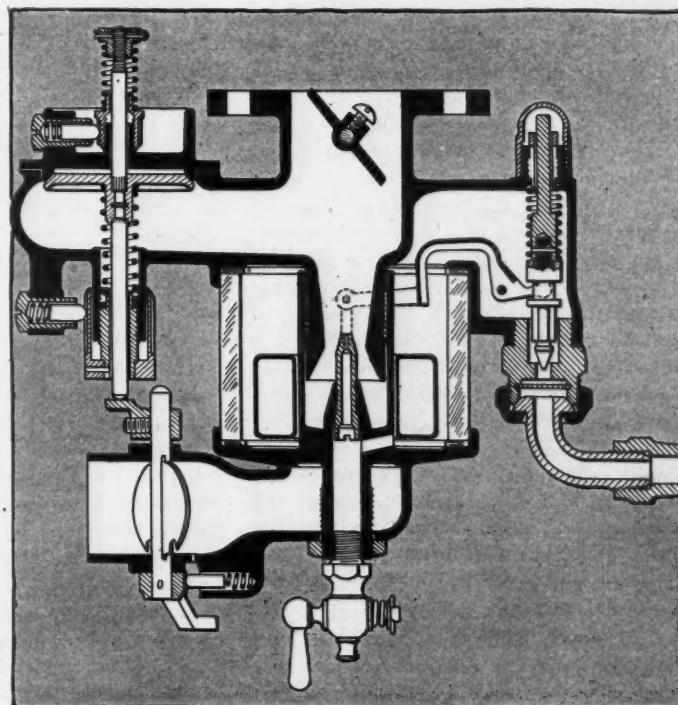


FIG. 5—STROMBERG CARBURETER, MODEL B

This is a concentric carburetor type built for air-cooled and thermosyphon motors. The float regulation of the gasoline needle valve is through a peculiar shape of lever arm, illustrated herewith

trol provided on the gasoline system, beyond the use of the extra size nozzles provided with the carburetor.

Stromberg Air System

The air system is shown in completeness in Fig. 4 and practically the same in Fig. 7. The main air supply enters by a base opening through the horn-shaped casting *H* and passes up through the venturi-shaped mixing chamber in which the nozzle *N* is located. The shape of the venturi, or hourglass passage is to direct the air current towards the tip of the nozzle and so accomplish a thorough mixing of the gasoline particles with the air.

There is a second air supply, namely through the spring-controlled auxiliary air valve *X*, which valve is located above the nozzle *N* and so the air coming through this valve does not pass the nozzle and therefore does not play a direct part in mixing or breaking up the gasoline as it issues from the nozzle. The secret of the auxiliary air valve is that it does not open on low motor speeds but only after speeds of 300 to 500 crankshaft revolutions per minute. When it opens it reduces the current of air passing the nozzle and so the pull on the gasoline is reduced and a smaller quantity of gasoline enters the mixture in proportion to the air entering it. In this way the auxiliary air valve, while directly providing more air indirectly, regulates the amount of gasoline from the nozzle. By a nicety of adjustment of the air valve it is possible to get the proper amount of gasoline at all engine speeds.

Construction of Air Valve

The construction of the air valve is an interesting detail of the carburetor. It is a flat disk valve *X* with beveled face and is controlled by two springs, one below and the other above. The lower one *LS*, *LS* is called the low-speed spring, the upper one *HS*, the high speed spring. You use the lower one to get the proper adjustment for slow engine speeds, the upper one for the medium and higher speeds. You can change the tension of either spring, there is an adjusting nut *AN* with a locker *I* to hold it in any position and also another *NB* for the upper spring. The theory of the two springs is that the lower one is set so as just to hold the valve seated when the motor is running idly and slowly at which the upper spring is entirely free of tension. The upper spring acts as a bumper to resist valve opening after a certain point and the greater its tension the harder the valve is to open.

The regulation accomplished by this auxiliary air valve is easily followed: Let us suppose that the gasoline level is correct, 3/16-inch below the nozzle tip, but the motor is not giving speed enough. This may be due to not enough gasoline and too much air. To remedy this, screw down the upper adjusting nut *NB*, making the valve much harder to open. What is the result? It takes much more motor suction to open the valve, consequently there is a

stronger suction on the gasoline in the nozzle and more gasoline is used in proportion to air, giving the required richer mixture. Too weak a mixture causes popping.

The introduction of heavier grades of gasoline during the past year or so has led to improvements in carburetors to facilitate starting, one of which is the starter valve, Fig. 7. This is a standard butterfly valve *Z* which normally rests parallel to the sides of the horn piece so as not to obstruct the air passage. When starting the valve is turned at right angles to the passage, thus entirely obstructing it except for a couple of openings *B* in the valve. When so shut the air supply is cut off so that when the motor is cranked the entire suction is exerted on the nozzle and much gasoline drawn out, as is needed. But a combination with the auxiliary air valve is needed, the air valve must be held shut otherwise when the motor is cranked the valve would be sucked open, the pull on the gasoline cut down and too lean a mixture drawn into the cylinders. The interlocking mechanism with the air valve is illustrated in the form of a cam *K* on the top of the prolonged stem *L* of the valve, the cam resting against the lower end of the auxiliary air valve, when the shutter valve is closed. This is a simple and non-adjustable inter-connection.

Improved Starting Methods

The use of heavy grades of gasoline has further called for the attachment of the intake horn *H* to which can be attached a length of flexible metal tubing extending to a drum or cylinder around the exhaust manifold so that only hot air from around the manifold is drawn into the carburetor. The object of hot air in cold weather is that it raises the temperature of the gasoline and aids in volatilizing or breaking it up. In the cold winter weather all hot air is needed, in hot summer weather not a bit of hot air is needed, and between these extremes every variation may be required. To meet these all-season requirements a season adjustment is added. It is a simple device in the horn *H* and is as follows: In the horn is a series of openings *O* cut in a circle around the horn. Over the horn at this point is a tight-fitting sleeve or band with corresponding holes.

Getting Right Temperatures

This sleeve may be rotated circumferentially so that at one time the holes in the horn coincide with those in the sleeve, whereas at another time the solid part of the sleeve will close all of the holes in the horn. By varying the size of these holes *O* it is possible in different temperatures to get just the correct amount of cold or heated air. Naturally in cold winter these holes are all closed and when the mercury gets above 80 they are all opened. Because of this adjustment it is not necessary to take off the flexible tube connection in the summer.

Before the use of the hot air intake pipe carburetor makers used the hot water jacket surrounding the mixing chamber to keep it warm and prevent condensation of

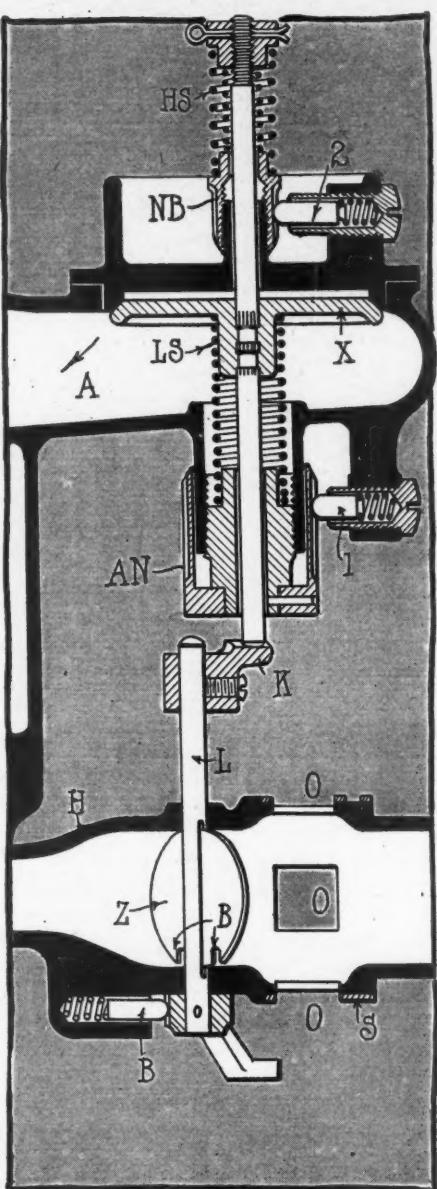


FIG. 7—THE AUXILIARY AIR VALVE

The parts of the air system are: *X*, auxiliary air valve; *LS*, low speed spring; *AN*, adjusting nut for lower spring; *HS*, high speed spring with adjusting nut *NB*; *I* and *2* are locking devices for the adjusting nuts; *Z* is starter valve; *O*, season adjustment sleeve

stronger suction on the gasoline in the nozzle and more gasoline is used in proportion to air, giving the required richer mixture. On the other hand let us suppose that when running slowly the motor "loads up," as the carburetor expert expresses it, meaning that too much gasoline is issuing from the nozzle and at slow speeds there will be missing and perhaps some very black smoke coming out of the exhaust—a certain indication of too rich a mixture. How can you lessen the gasoline supply? First ascertain if the gasoline level is correct by the horizontal line on the casing and if correct then loosen the tension on the high speed spring *HS*. This lets the valve open on slight motor suction, allowing more air to enter and so not requiring so much to pass the nozzle. This lessens the motor suction on the nozzle.

the gasoline particles after they issued from the nozzle. Two Stromberg models use the waterjacket, the exception being model B, the concentric-float type used for air-cooled motors and thermo-syphon types. In summer weather it is recommended to shut the water out of the jackets. The value of shutting the water out of the carbureter jacket was well illustrated some years ago in connection with the Algonquin hill-climb. A certain car was not able to make the hill under a certain time with the hot water of the cylinder jackets circulating around the carbureter. The water was shut off and nearly 3 seconds cut from the time required to climb the hill. In this same contest another peculiarity in carbureter adjustment came up. A certain car was not able to get enough air into the mixture for the best speeds. It used an auxiliary air valve but still the motor did not give the speed. To remedy the trouble a few small holes were drilled in the intake manifold and enough extra air obtained so that better time was made. With the modern carbureter, improvements in the air valve have taken care of such carbureter shortcomings as this.

Drivers Should Study Adjustment

The adjustment of his carbureter should be understood by every car driver. Directions for such adjustments are generally given in detail in instruction books, but so often these precious volumes are thrown aside when the instrument is purchased and are never seen again. There are a few general laws on carbureter adjustment and while the rules of setting one make will not suffice for another, a knowledge of adjusting in general will aid in every particular case.

With the Stromberg the gasoline and air can be adjusted. The gasoline adjustment is simple. The level in the float chamber must correspond with the line on the carbureter body. Instructions as to how this may be done have already been given.

The adjusting of the air or setting the auxiliary air valve is more difficult. To begin you adjust first for low speed. Start the motor and turn the adjusting nut AN up or down until the valve seats lightly and the motor runs slowly without missing.

For highspeed adjustments turn the high speed adjusting nut NB up until the motor runs without backfiring; backfiring is due to too lean a mixture. If on the other hand black smoke comes out of the muffler the mixture is overrich and the nut will have to be turned down.

Supposing that with this done the motor does not give sufficient speed on high, suppose further that the nut BN is raised, making the valve as difficult to open as possible in order to give a rich mixture and still the desired speed does not come, it is practically a certainty that a large nozzle is needed, provided of course that all necessary steps have been taken to

ascertain that the carbureter is at fault and that the trouble does not lie with faulty ignition, lubrication or water circulation. In its instructions on adequacy of nozzles the company says: "If after the adjusting nut AN is correct you find that the valve is off the seat with the motor at rest, the nozzle is too large. If on the other hand you find that the nut BN has to be turned up so high that the high speed spring is in contact with the small nut on the top of the air valve stem when the motor is at rest, in order to get the proper mixture on high speed, the nozzle in use is too small."

Possible Troubles

Aside to carbureter troubles which may be due to improper adjustments there are other troubles which come up too high or too low float adjustment are in this category. Each has its symptoms and its causes. A too high float level may be due to dirt under the needle valve, Fig. 6, preventing its seating properly and entirely shutting off the flow of incoming gasoline, the result being flooding of the nozzle. A second cause is a sticking needle valve, the needle valve being up as illustrated but held from coming down by small particles of dirt, which may enter through a small perforation in the acorn cap V4. The only remedy in either case is removing the top of the float chamber and cleaning thoroughly. A third and very rare cause of too high float level is a weak spring. A spring is normally equal to the life of a carbureter.

There are one or two causes for too low a float level, which is chiefly caused by not sufficient pressure in the gasoline tank if a pressure system is used; or in a gravity system there may not be sufficient head for steep hill work. The horizontal line on the carbureter body is the great criterion for determining proper float level.

The symptoms for too high a float level exhibit themselves when the motor is running idle and starting up. There will be missing and perhaps black smoke emitted from the muffler, but with the motor under speed both of these will disappear, recurring again on low speeds and re-starting.

It is almost impossible to lay down any definite law for chasing down a carbureter trouble. The different carbureter companies maintain service departments in conjunction with many of their branches and in these employ expert trouble men. In 90 per cent of the cases of supposed carbureter troubles these men report that the fault lies in the ignition system, in lubrication, or some other place. Frequently the spark plug points are too wide, the battery weak, or a connection loose.

In beginning the diagnosis of a trouble look first at the float level and see that it checks up with the standard line.

Second, go to the low speed spring adjusting nut, and see if with the motor throttled or running idle the valve X seats. It may be the spring is too strong or too weak. If too strong it can be detected by the amount of pressure necessary to open the valve. This is gauged by pressing down on the top of the valve stem with the finger. On the other hand, if too weak the valve X will not be seated.

Third, if the gasoline level and air valve are correct, but the motor still misses look for leaks in the joints of the intake manifold.

Fourth, if the manifold is found to be all right, examine the spark plugs for cracked insulation and for the points being too wide. If a magneto is used the points should be 1/64-inch apart, and a little wider for a battery. It will be found satisfactory to have them $\frac{3}{16}$ -inch for the battery. The wider gap for the battery results in a hotter spark than if close together.

Investigating Troubles

Supposing that the spark plugs are found correct, the magneto should be looked through, and also the wiring. There may be a short circuit or dirt under the distributor parts, or the breaker mechanisms of the magneto. If, however, the magneto is found correct and there still is a missing, the chances are a larger nozzle in the carbureter is needed, because the miss would indicate that the motor is not getting sufficient gasoline.

Troubles with a leaking float are very rare in these days of improved construction. When a float leaks its weight is increased and the indication of this in a carbureter action is a lowering of the float level which can be checked up by the hor-

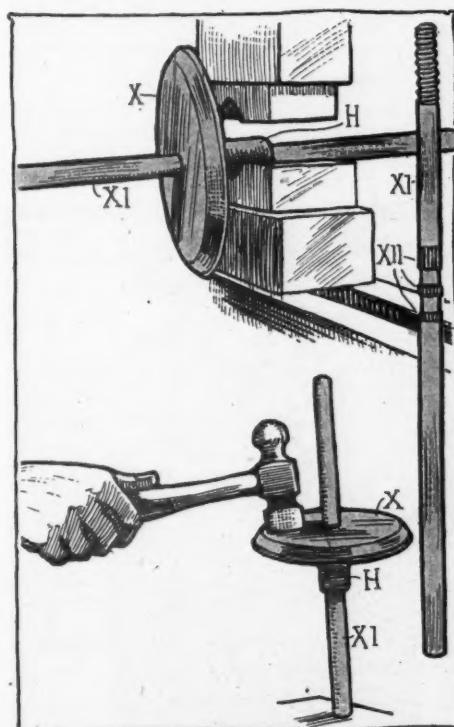


FIG. 8—STROMBERG AUXILIARY AIR VALVE

This valve is a brass mushroom-type X on a Bessemer steel stem X1. The stem is serrated at XII and the hub part H of the valve is crimped onto the stem, the soft metal filling the serrations, and making a job that will not readily loosen up when device is in use

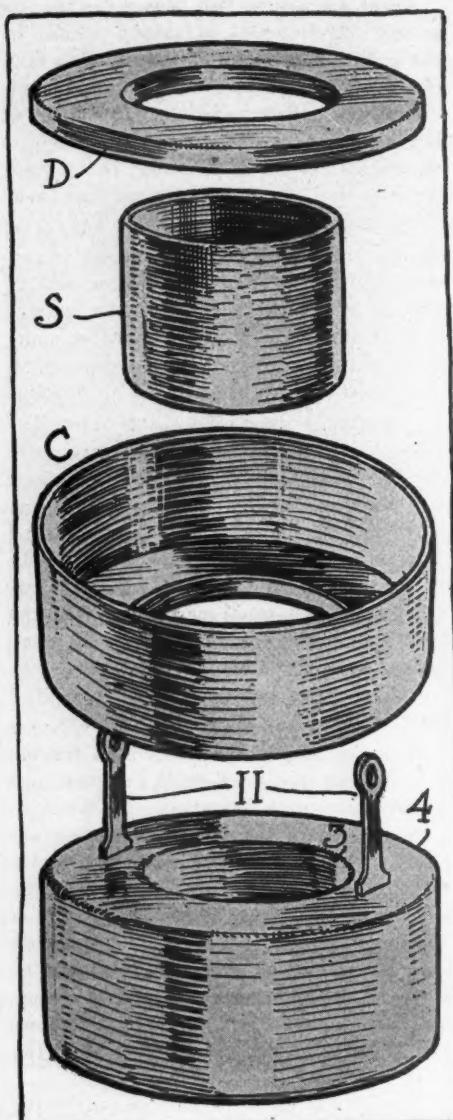


FIG. 9—MODEL B FLOAT DESIGN

In Stromberg model B a stamped copper float is used made in three parts, cup C, sleeve S and cover D. The circle of soldering is designated by 4

izontal line. The presence of a leaky float is verified by shaking the float in the hand, the noise of the gasoline within it being easily distinguished.

Guarding Against Leakage

In order to guard against float leaks every precaution in manufacture is taken. The Stromberg float construction in models A and C is shown in Fig. 10: the float the cup portion C, the cover D, and the sleeve S. These three parts are soldered together, the points of soldering being designated 1 and 3 where the sleeve unites with the top and bottom, and at 2 where the cup and cover unite. The cup and cover portion are copper stampings, whereas the sleeve S is a length cut from a copper tube. In putting the cover D into the cup portion it fits snugly within and having a slight taper leaves an annular space between it and the top edge of the cup which is filled with solder thereby insuring a gas-tight joint. The construction of the float in model B is similar, excepting that the sleeve S is of larger

diameter and the float has the two vertical portions I for hinging to the level mechanism which works the needle, as illustrated in Fig. 5.

Before the floats are assembled into a carburetor they are given a strenuous test on air tightness. They are placed in a large tank partly filled with gasoline and 25 pounds air pressure placed on the gasoline. After being immersed in this for 8 hours they are removed and held beneath the surface of hot water. The hot water is intended to heat any gasoline which might enter the float and cause it to pass off in the form of air bubbles which can be readily distinguished rising to the surface of the water. The company recommends that whenever a user has a leaky float he should at once forward it to the nearest branch, or to the factory.

NO NEW ENGLISH MOTORS

London, May 11—Apart from the Argyll Co., which introduced the single-sleeve motor at the last motor show, no other firms have yet introduced commercially any new type of motor. With regard to this Argyll engine, action has been brought against the Argyll Co. by the proprietors of the Knight engine, for infringement of patent. This case will be before the courts sometime during the summer.

The Reno Sphinx engine, which has been already developed to a small extent in the United States, a company having been formed for the American rights, is making progress in this country, and an engine of this type has been under demonstration for the past 2 or 3 months, with very satisfactory results. There is every indication that before the next Olympia show, this motor will be adopted by one or more British manufacturers.

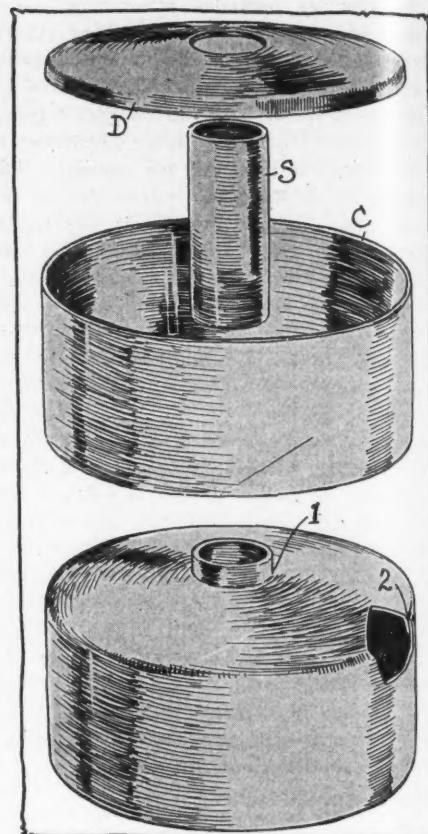


FIG. 10—FLOAT CONSTRUCTION MODELS A AND C

In Stromberg models A and C the copper float is made in three pieces, cup C, cover D and sleeve S, all three of which are soldered carefully together. The parts C and D are stampings

Compared with the poppet-valve engine of the same dimensions, the Reno motor is said to show better speed and greater hill-climbing capacity. There also is a marked absence of noise as compared with the poppet engine, and there appears to be no difficulty as regards lubrication. The ease with which the valves of this engine can be removed is a remarkable feature; for instance, any ordinary driver can remove the valve from the cylinder in a time not exceeding 4 minutes.

CROPS IN THE NORTHWEST

Minneapolis, Minn., May 27—Crop conditions in the northwest still promise well. Selection of seed, building of silos and conservative expenditures, with improved methods, are suggested by a Minneapolis commercial paper house as features of the situation promising well in North Dakota. Thomas Cooper, head of the North Dakota Better Farming Association, says the cool weather has served to drive the roots of grain down and that small grain seeding is practically done. Some more oats and flax is to go in. There is too much moisture in the northern counties, and the eastern and southern portions could stand more rain. George Lawrence, minister of agriculture, says that prospects for a bumper crop in southern Manitoba never were better. Ninety per cent of the wheat is sown and the acreage is to be the largest ever. Small grains will average better than last year.

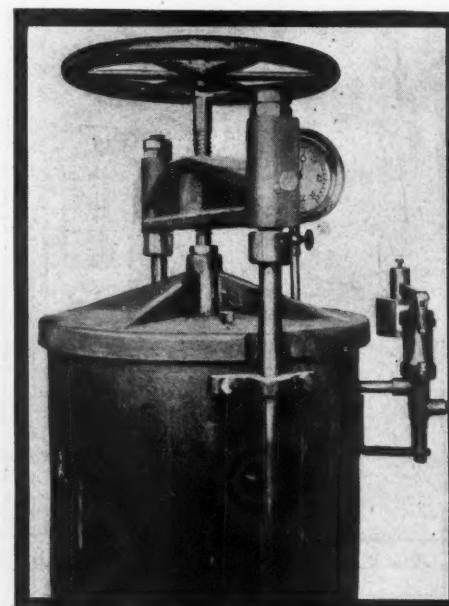


FIG. 11—STROMBERG FLOAT TESTING

Before the copper floats are approved they are given a test under air pressure in this large tank to see if gasoline can be forced inside them



The Motor Car Repair Shop

Hints to the Amateur On—Locating Trouble—Slipping Clutch —Overloading Car and Testing Axle Trueness

HERE are two ways of finding trouble. One way is to dig right in and test every feature that may in some way be directly or indirectly connected with the symptoms; the other is to carefully weigh the possibilities by first turning the situation over in mind, and after having arrived at a most plausible cause for the trouble, proceed to prove the diagnosis. The first is a hit-or-miss method generally employed by novice and grandstand experts; while the latter is the direct course followed by those who would be successful trouble-hunters. The writer has seen days wasted in overhauling an entire ignition system to eliminate a miss that was caused by loss of compression; an entire set of valves ground in to recover lost compression that was caused by a defective valve cage gasket; and an entire set of bearings examined to locate a pre-ignition knock. These are some of the common cases in which much time, trouble and expense might have been eliminated had a little logical forethought been used.

If the Clutch Slips

If the clutch slips look to the rods and devices governing its operation, and see if it is allowed to go all the way in. Lubricating oil will cause a clutch to slip. It often has been applied by mistake or dripped down on the clutch from the lubricator, and should be washed out with gasoline, then kerosene, and neatsfoot oil applied. Possibly the spring is weak and needs taking up. If a clutch, which under ordinary conditions gives good service, should slip when called upon to pull a car through exceptionally deep sand, or up an exceedingly steep grade, it is time to get out and push or find some means of reducing the load on the clutch. Do not attempt to make it hold by applying sand, etc., or by speeding up the motor and letting the clutch in quickly. The use of sand is liable to destroy the pitch of the flywheel, and letting the clutch in quickly either will twist off a driving-shaft or universal joint, or burn the clutch-leather. Where a clutch has been burnt, a new leather is necessary. The best temporary treatment of a burnt clutch is the application of a mixture of glycerine and olive oil; but fuller's earth, litharge and other floury substances have been successfully used in cases of emergency.

For metal-to-metal disk clutches a mixture of kerosene and cylinder oil is a satisfactory lubricant. The proper proportions of this mixture must be found by the driver. If the clutch slips reduce the proportion of cylinder oil; and if it grabs reduce the

proportion of kerosene. Clutches whose frictional surfaces are metal-to-asbestos, thermoid or some other anti-friction fabric, are designed to run dry, and should not be oiled except in case they become so dry that they take hold too fiercely. Disk clutches should have the oil removed regularly, the disks cleaned with kerosene and fresh oil added.

Overloading the Car

As long as the motorist will permit his car to carry six, seven or eight passengers when it is designed for four or five, the repairman is bound to be called upon, to straighten sprung front axles, replace springs that have flattened out from the overload, and truss up sagged side frame members. Of course, one enjoys being generous; the more the merrier always is an inducement to overload the motor car; but the life of the car, and the efficiency of its service throughout that shorter life is greatly decreased by just a few trips with its load exceeding its capacity. When a car is rolling along over a smooth road too heavily loaded, a strain is put on the springs, axles and frame that may be bending them almost to the point of taking a permanent set in a bent position. Thus it remains but for a single bump due to a hump in the road, a raised street crossing, or a gulley, to strain all of these features beyond the elastic bending point, causing misalignment and other troubles.

Misalignment between the motor and transmission mechanism, which, except in unit power plant constructions, causes excessive wear in the universal joint between clutch and gearset. A sagging frame

not only gives the car a broken-down appearance, but the doors are jammed against the pillars at the top so that they open with difficulty, and rubbing against these pillars while the car is in operation gives rise to annoying squeaks. When the springs have been strained they flatten out so that the frame strikes the bumpers at every fair-sized hump.

Testing Front Axle Trueness

In Fig. 1 is shown means employed in a Chicago repair shop to test the trueness of motor car axles. The equipment comprises two round bars S having spindles at one end which are adapted to fit into the yoke-bearings Y or the steering-knuckle pins; a long straight edge E designed to rest on collars C formed at the top of the constricted lower portion of the rods S; and an adjustable trammel-point gauge T adapted to measure the distance between the centers at the top and bottom of the rods S.

If the axle is sprung so that the knuckle pins would not be vertical, there would be a difference between the top and bottom centers of the rods S, as indicated by the trammel points on the bar T. If the axle is twisted, there would be a difference in the trammel point measurements; and lack of parallelism of the two rods S would be plainly visible to the eye when observed from the position of the operator at the right of the illustration. A depression in the axle that might not be indicated by either the rods S or the trammel points, would be exposed by the straight edge E as it rests on the top surfaces of the collars C. If the axle is true the straight edge would rest snugly upon the collars all the way across; whilst if untrue, there would be poor contact toward one side of the collars.

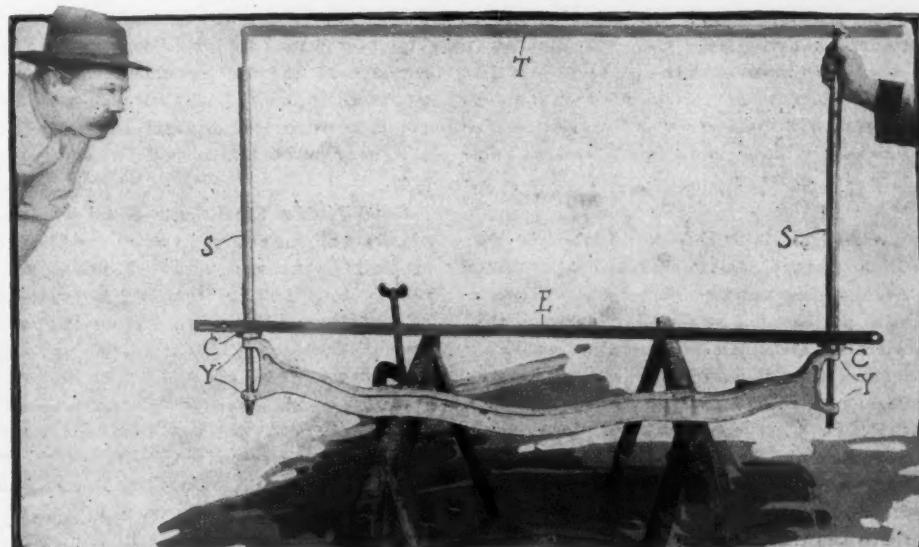


FIG. 1—EQUIPMENT FOR TESTING FRONT MOTOR CAR AXLES



From the Four Winds



SNOQUALMIE FALLS, POPULAR RENDEZVOUS OF PUGET SOUND MOTORISTS

WILL Talk on Carbureters—At the June 6 meeting of the Detroit branch of the Society of Automobile Engineers, E. J. Stoddard, of Detroit, will give an address on carbureters and the fuels they use.

Iowa Tour Postponed—The all-Iowa "little Glidden" tour which had been planned for the middle of June has been postponed until fall. The pathfinder was to have started last week, but business in Iowa is so rushing at the present time that the dealers do not want to leave for such a tour. In September it is thought the business will be more quiet, and in addition the weather will be much more pleasant than the June dates.

Added to North Dakota's List—The Burleigh County Automobile Club and the North Dakota State Automobile Association perfected organization and affiliated with the American Automobile Association last week at Bismarck. The directors are: President, Fred Carstens; Secretary, Grant Call; R. C. Battey, W. H. Costello, C. Bertsch, John French and R. L. Best. The first work of the club will be to send a man from Bismarck to Jamestown to make a route for the guide book. The association will get out a book of the principal state roads. A club has been formed at Dead-

wood, S. D., to aid good roads work. R. Flanders is president, C. W. Rough is vice-president, Joe Goldberg is secretary.

Opening New Territory—Merchants of Moline, Ill., and farmers of the surrounding territory have raised \$3,240 to build a road some 20 miles long into Rural township and to open up a rich farming district with inadequate railway facilities. The improvement will cost at least \$7,000. The new road has long been agitated by car owners and the increase in number of machines among both townspeople and farmers made the demand so great that the improvement received financial support.

Road Picnics the Latest—Road-repairing picnics and log-rolling parties are the latest fad in Arizona. Last Sunday about twenty members of the Douglas Automobile Club took their cars out on the road east of that city and spent the day with shovels and crowbars, filling chuck holes, grading rough stretches and removing rocks. Members of the Bisbee Automobile Club have spent two Sundays bettering the road between that place and Douglas. The Prescott Automobile Club is planning to have a number of Sunday picnics for the purpose of repairing roads in Yavapai county preparatory to the Arizona

Motor Co.'s sociability run for Studebaker cars from Phoenix to the Grand canyon, next month.

Columbus After Country Home—The Columbus Automobile Club of Columbus, O., has named a committee to investigate the proposition of securing a country club house for the use of the members. It is proposed to erect it on some good road within a distance of 40 miles of the Buckeye capital. A site at Buckeye lake is being seriously considered.

City Rigs Not Exempt—Secretary of State James Rose has decided that motor cars operated by any city motor fire apparatus or motor patrol wagons or ambulances in service by the police department of the city must carry a state license tag, the same as cars of private ownership. The point was raised in Danville, where it was argued that the municipality was exempt. The sheriff was directed to arrest the driver in all cases where no tags were displayed.

Horses Scarce in Central Illinois—It is an extraordinary fact that there is a marked scarcity of horses on central Illinois farms. With nearly every farmer owning a motor car, the stock of horses has been allowed to decline and most of the farmers are now finding that they went too far in disposing of their equines. They are now short in many instances for their work this spring and have been forced to rent horses from the better supplied neighbors or liverymen or others in the cities.

Bisons' Country Home Opened—The Automobile Club of Buffalo held its formal opening of the country club house at Clarence, N. Y., on May 23. About 3,000 motorists from western New York and various points in Canada were in attendance at the opening. A feature at the club house this season is the charging station for electrics which was recently installed. A bandstand is being erected on the grounds and it is planned to hold concerts every Sunday afternoon and evening during the season.

Two Cars for Each Farmer—The well-to-do farmer and business man of central Illinois has found that he requires two motor cars, one for business and rough usage in bad weather or on poor roads, while he reserves his largest and best car for pleasure driving. This is but another evidence of the modern adaptiveness to changed conditions following the passing of the horse. When the equine age was at its height, the well-to-do farmer or business man kept two vehicles, the buggy for the trips to town on business or when the roads were bad, while he reserved his surrey or two-seated family carriage for the church, circus or other pleasure driving.

By using the older car for the bad weather and poor roads, the better car is saved for less destructive conditions and the ownership of two cars is soon proved to be economical and satisfying.

Another Long Run Planned—Another ocean-to-ocean tour will be started in a few weeks by Al. G. Faulkner, sales manager of the Los Angeles branch of the Pierce-Arrow, and Dr. S. S. Crow, of that city. The trip recently completed by the Examiner-Case car consumed 41 days and was necessarily slow, so as to make all measurements carefully. The trip to be taken by Faulkner and Crow will be to advise motorists as to the best season of the year to make such a trip, and the length of time consumed.

Employer Held Liable—It has been held by lawyers that the man who employs a chauffeur to drive his car is amenable to the new employees' compensation law in Illinois. Should the driver fracture his arm in cranking his employer's car, the latter must allow full wages while the employee is incapacitated, according to the decision of lawyers who have examined the law. There is a movement, which is receiving many supporters, to amend the law so as to make it apply only to corporations.

Motor Trade Trip—The trade extension committee of the Boston Chamber of Commerce has made arrangements for a motor trade trip from Boston through western Massachusetts, Vermont and New Hampshire, which will occupy 5 days, June 10-15. The members of the Boston party will meet business men and merchants at a number of the cities en route and addresses will be made by officers of the local boards of trade and by the visitors establishing cordial trade relations. The last trip of this kind made in 1909 was by train, but this year the value of the motor

car is being recognized as affording a chance to reach places off the main lines of travel.

After the Joy Rider—Determining to break up the practice of joy riding with the cars of their employers by chauffeurs, five car owners of Bloomington, Ill., have banded to prosecute every case of this kind, whether the owner of the car taken is agreeable to the action in court or not.

Virginia Registrations—Up to May 28 the secretary of the commonwealth of Virginia had registered a total of 4,163 motor car licenses for the year 1912. With less than five months of the year gone, the total is ahead of the entire year of 1911, when 4,020 licenses were issued. During the past twelve months there has been an increase of fifteen electrics in Richmond, bringing the total in use in this city up to fifty.

Honduras Aroused—By carrying out a program of road improvement which has just been announced by the department of public works, motor cars soon can be used to much greater advantage in Honduras. A road is to be built from San Lorenzo to the capital and the old highway connecting Tegucigalpa with Comayagua is to be transformed into a boulevard. A new road also is to be built to Olancho. Orders for steam rollers and complete road building

equipment were placed in the United States some time ago and it is expected to arrive soon. Work on the roads will be begun immediately on its arrival.

Build Road on Levee—Largely through the efforts of owners of motor cars in White Castle, La., 18 miles of splendid road has been built along the levee here. This makes one of the most picturesque runs in the whole Mississippi basin. Motorists will stand the expense of maintaining the road in its present excellent condition.

Dallas Considering Club House—A movement has been started by the Automobile Club of Dallas for the establishment of club grounds and a club house at Dallas, Texas. It is likely that should the movement receive proper support that the grounds will be located about half way between Dallas and Ft. Worth. In all probability the two clubs will cooperate and build a club house.

Another Good Roads Boost—Fifty miles of good roads will be built this year in Genesee county, Mich., according to an agreement reached by the county road commissioners and the board of supervisors. The commissioners asked for \$100,000, or one-fifth the bond issue recently voted by the county for highway improvement purposes. Fourteen townships will benefit from the work done this year.

Columbus May Have Speedway—The Columbus Automobile Club is discussing the question of constructing a motor speedway to be located at the Ohio capital and to be modeled after the speedway at Indianapolis. The matter of constructing a board track also is being considered and plans and specifications for the board track are being prepared. The matter will be discussed at a special meeting of the club about June 1.



KALISPELL AUTOMOBILE CLUB OPENING NEW HIGHWAY BETWEEN KALISPELL AND BELTON, MONT.

The Realm of the Motor

First Real Test of Army Motor Planned

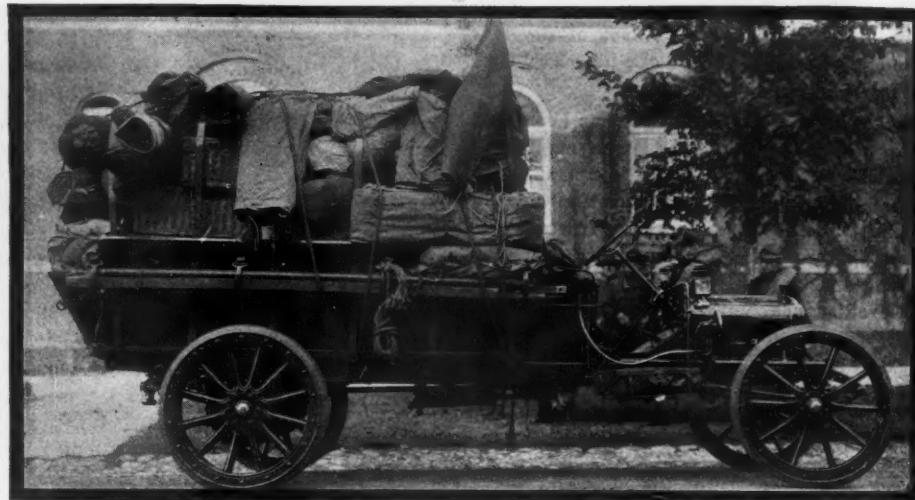
PLANS have been completed by the United States military officials for the first official test of the motor truck as an army adjunct. Twenty power vehicles will be attached to a regiment of 1,500 men which is to be assembled at Dubuque, Ia., on June 5 to try out the new army equipment. From Dubuque on June 10 the soldiers will leave for a point near Madison or Sparta, Wis., in full marching order, with war equipment, and the whole route will be covered as if in the presence of the enemy.

First Real Test

As the first real official test of the motor wagon this march will mark an epoch in the history of the motor wagon, and the results of the tests will be awaited with interest by all those interested in the development of the commercial vehicle.

For the entire journey it is intended that the army will be supplied from Dubuque as a base, all supplies being carried by motor truck, and it is the belief of the government authorities who have the matter in charge that an army can operate for a radius of 100 miles with no railway connection, being served and connected with its base solely by motor trucks.

The testing of the trucks is very largely



TYPICAL ARMY TRUCK AS IT APPEARS LOADED

Twenty Power Vehicles Will Be Tried Out Next Month When a Regiment of Regulars Will Assemble at Dubuque—Soldiers to Be on War Footing

the result of a tour with four government trucks made recently by Captain A. E. Williams of the United States army, from Washington, D. C., to Indianapolis, Ind.

The route led from Washington to Atlanta, to Richmond, to Greensboro in North Carolina. From here the national highway was followed to Atlanta, the roads being in awful condition, however, through questionable repair work. From Atlanta the drive was through Chattanooga and over the mountains to Nashville by Sherman's route. Roads were good from here to Indianapolis. In all the trip the loads never were taken off. There were four cars in the party but one dropped out at Nashville with burnt-out engine bearings. Captain Williams has left Chicago for Indianapolis to drive the cars to Dubuque preparatory to this new test march.

Dubuque Demonstration

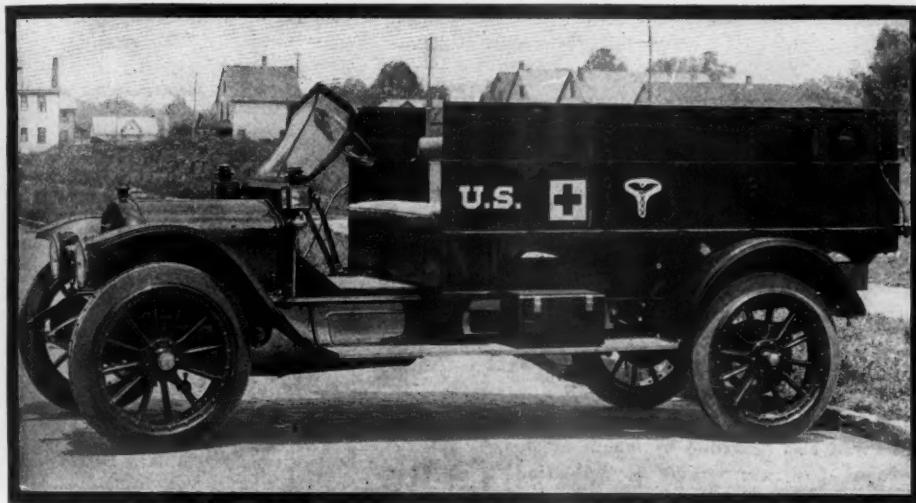
The army is looking for a motored vehicle which will suit its requirements and is carrying on this Dubuque test very largely that makers may observe and come to understand just what manner of vehicle is demanded by the war department, and can therefore build and develop a motor wagon suitable to the work. The larger vehicles do very well much as they are for their class of work but the army is looking toward a vehicle of 1,500-pound capacity as its final unit and will eventually replace every four-mule team and wagon now in use with a motored vehicle of some



FOUR-WHEEL DRIVE TRUCK ON WASHINGTON-INDIANAPOLIS RUN—CAPTAIN WILLIAMS OF UNITED STATES ARMY IN FOREGROUND

Commercial Car

U. S. Government Desires Truck Data



TYPE OF ARMY FIELD AMBULANCE

Recent Run from Washington to Indianapolis Whets Uncle Sam's Appetite for Information—Captain Williams Talks About Hardships of Cross Country Journey

type. The 3-ton trucks will be tested in this maneuver from the base along the line of communication, carrying 12,000 pounds a day of supplies, etc. Two trucks are figured on to do this work.

The 1500-pound vehicles will be assigned one to each company in place of a four-mule team as formerly. It is from these that the important data will be gathered as their work will be so different from ordinary routing and the conditions they have to meet so varied.

The 3-ton machines have been rented by the government for the test. Among the makes to be tried out are the following: Velie, White, Saurer, Packard, Gramm, and a Four-Wheel Drive car. The government already owns a White, Sampson and the Four-Wheel-Drive of the 1,500-pound size and there will be further furnished for a test a Kelly, Mack and a Kato, the last named a four-wheel drive made at Mankato, Minn.

Trials of Army Trucks

Captain Williams who has the matter in charge, in the run with the four motor trucks from Washington to Indianapolis, learned much as to what an army truck should be able to do. In one case a road was encountered flooded so deep with water that the wheels were completely

submerged. The Four-Wheel Drive, having its motor, and especially the carburetor, so high up went through on its own

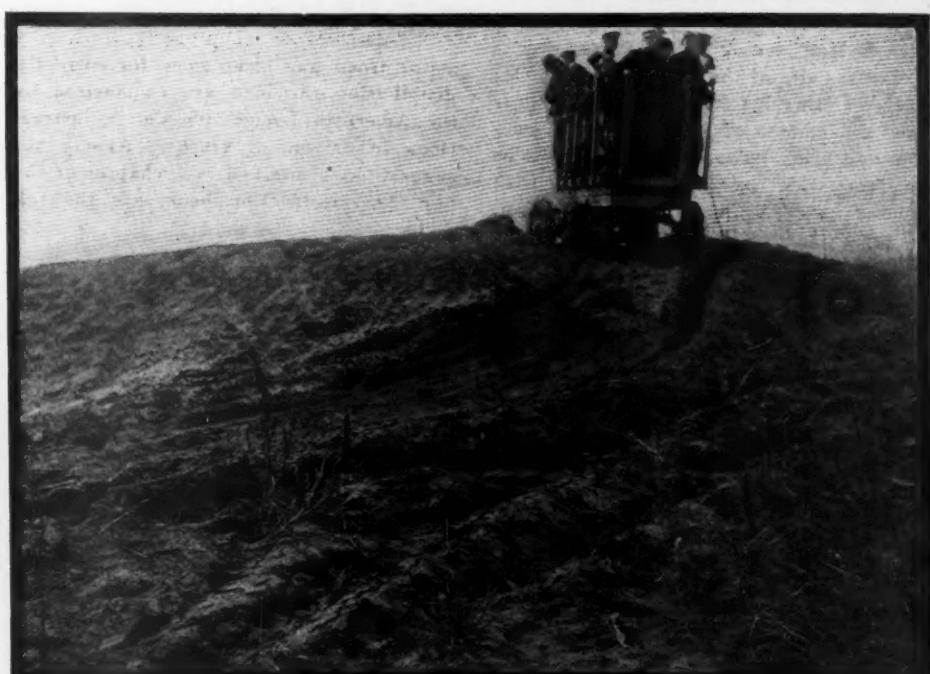
power with the wheels under, the water missing the carburetor by a mere inch. The other cars submitted to our old friend the horse before they got through.

"Motor trucks for our work should be much lighter," said Captain Williams, "and they keep making them heavier. They should be light and lively. When they are heavy they sink in and are of little use in deep sand and mud. That is one reason why this route for our march was chosen, for there is much deep sand to pass through. All of this is at slow speed as well. Speed is of little object in this work. Indeed 2½ miles an hour is plenty for most work.

"On the run in from Washington to Indianapolis the driver of one truck made that statement at the end of one day's run that he hadn't been off first speed all day. Low-gear work is the rule and at a mule's pace."

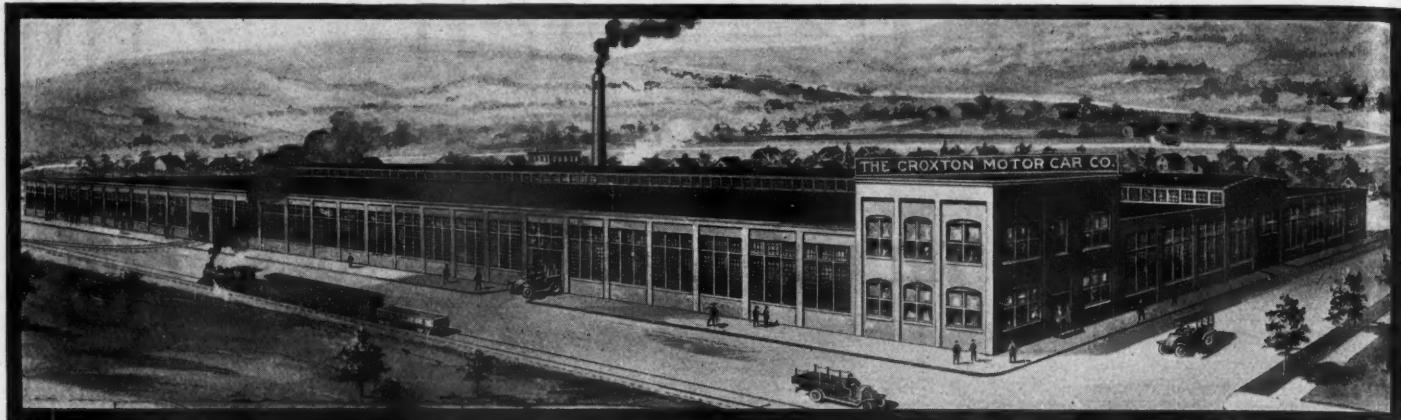
To Try Out Ambulances

Beside the freight work there are to be tests for ambulance and medical work. The medical department figure that four motor ambulances will take the place of 12 miles. Different types of ambulance devices will be tried out on this run.



FOUR-WHEEL DRIVE ARMY TRUCK PULLING THROUGH DEEP SAND ON WASHINGTON-INDIANAPOLIS RUN

Reorganized Croxton Company Moving to Washington, Pa.



NEW PLANT OF CROXTON COMPANY AT WASHINGTON, PA.

FORMAL notice of the intention of the Croxton Motor Co., maker of taxicabs and motor cars, to move from Cleveland, O., to Washington, Pa., was made this week, it being expected the company will be in its new plant by August 1. It is the intention to reorganize and take out a Pennsylvania charter as the Croxton Motor Car Co., with a capital stock of \$300,000.

J. P. Stoltz will be president and general manager of the new company, the same position he now holds. The new directors of Washington, Pa. will be as follows: John H. Donnan, vice-president of the Citizens' National Bank; A. M. Linn, president of the First National Bank; A. C. Warne, treasurer of the Washington Trust Co.; J. D. Bigger, director Real Estate Trust Co.; C. S. Caldwell, of the A. B. Caldwell Co., and G. W. Dudderar, managing secretary of the Washington Board of Trade; and J. I. Brownson, attorney-at-law, director of the Washington Trust Co.

The Croxton company has taken a large tract of land located on the B. and O. adjoining the site of the new Topliff-Ely Co., and comprising 7 acres. The new plant is to be constructed of structural steel, concrete and brick. The main factory will be 120 feet wide by 500 feet long with structural steel spans 40 feet by 25 feet. The steel winders, the walls and monitors, make an ideally lighted and ventilated construction. The capacity of the plant will be 1000 cars a year; and enough adjacent land has been secured for the addition of another building next year.

Chief among the departures from the usual type of design in motor cars in the Croxton is the method of mounting the radiator back of the motor, avoiding any damage by collision. This allows easy inspection of the motor from the front. Owing to the radiator being mounted behind the motor, the frame is made very narrow in front, which allows the car to be turned in a small radius rear. The water circulation is the thermo-syphon system. The hood over the motor, having no openings and combined with an under pan,

keeps dust, dirt and water from the motor and working parts. The motor is cast in block and has a bore of 4½ inches and stroke of 5½ inches. The motor is supported to the main frame by three-point suspensions. Valves are all on one side and inclosed. The water manifolds and valve covers are polished aluminum. Ignition is by a high-tension magneto of new construction, timing being automatically advanced and retarded by means of a centrifugal governor, which is embodied in the magneto. It is completely encased and dips into an oil well.

The transmission is designed for taxicab service, being in a unit with the clutch and control levers. The front axle is of heavy I-beam section one-piece drop forging, with roller bearings in the hubs and ball-bearing steering knuckles. The rear axle is a floating type with pressed steel housing. The steering gear is of a new patented design.

RULES FOR LOADING TRUCKS

The importance of properly loading a motor truck and some rules for correctly distributing the load are emphasized by the American Locomotive Co. in instructions to drivers of trucks. Among the suggestions, contained in a chapter of the new Aleo instruction book, are the following:

Balancing the load is a big factor in the successful operation of a motor truck.

Do not place all the heavy articles on the rear of the truck. If you place a heavy article on the rear of the truck, put an article of like weight on the front also.

Do not place the load on one side of the truck. If the load is small, center it.

If you have a small and heavy load, such as steel rails, use a small body. Have the body constructed so that the load will be centered.

There was one case of a large dealer in structural steel supplies who used a platform body which extended over the wheels. The truck pulled up to the loading platform sideways. The shipping department employees, as a matter of convenience, pushed all the load of steel on one side. Of course, the springs on this side were weakened. The tires also showed abnormal wear on that side.

If a tank body is used to haul over rough roads, it should be made only large enough to carry a normal load.

Some drivers are unnecessarily hard on tires. The way the truck is loaded has a good deal to do with the wear. Balancing the load not only saves the tires and springs, but the driving mechanism also.

Don't overload the truck. If the body is too big, don't load to the capacity of the body.

When a horse is overloaded, he will not start. The load has to be taken off until he is able to proceed. When the power is applied in a motor truck, the truck will move, no matter what the load may weigh. It will do this even if greatly overloaded.

But at the end of the season, when the truck is overhauled, poor judgment in loading tells. There probably will be many parts to replace that should not have been replaced for many seasons.

TAXICAB REORGANIZATION

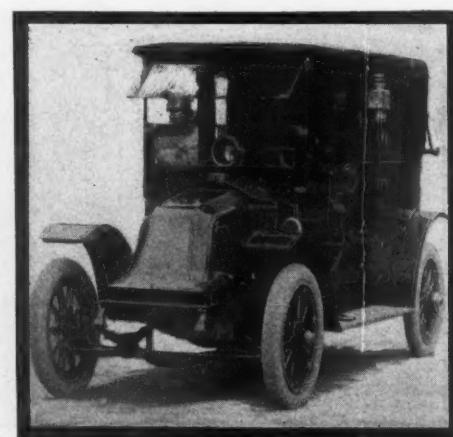
The business of the Connecticut Taxicab Co., of New York, which has been reorganized and changed to the Yellow Taxicab Co., has purchased the New York Transportation Co. and the Cab and Taxi Co., all of which will be under the one management. Arthur R. Rockwell, of the New Departure Co., is president and Jesse Judson, a former Bristol man, assistant treasurer. The New Departure Co. has been producing the yellow taxis and they will continue to put them out.

ALBANY, N. Y., IN LINE

Albany, N. Y., was added to the list of cities having motor fire apparatus by the installation of a motor fire engine. A test which was given the new motor engine proved unusually satisfactory and was witnessed by President Edgar C. Griffiths, of the Albany board of underwriters.

TAUNTON MOTORIZING

There has just been delivered to Chief Fred A. Leonard, of the Taunton, Mass.,



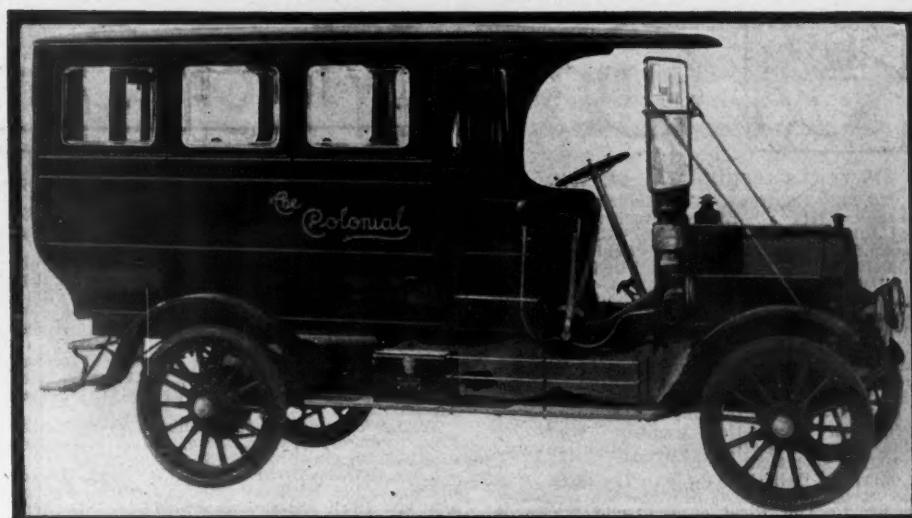
CROXTON TAXICAB

fire department, a Pope-Hartford combination motor chemical and hose truck that was built from designs submitted by the chief. This is the first step toward motorizing the Taunton fire department. The new vehicle combines some new features not embodied in regular motor trucks. The hose body is built in two box-shaped compartments which have a capacity for 500 feet of hydrant hose each, while these boxes are so arranged that they afford seats for the firemen, and the ladders being carried on the sides make a back rest for the men. The chemical tank is covered and it has a Fifer head, the latest invention in this line.

This vehicle will take the place of two hose wagons and one chemical, which means the passing of six horses.

NEW STATION LIMOUSINE

A railway station limousine, operated by the Colonial hotel, of York, Pa., is equipped with a large, roomy body and carries ten passengers. The interior is finished in mahogany highly polished with silver trimmings. The upholstering is in dark green leather, cushions of the latest type, spring and air. The windows are equipped with beveled glass, drop panel sash, and are fitted with rubber protectors to prevent the dropping of the sash. A three-bulb dome light, finished in silver,



HART-KRAFT RAILWAY STATION LIMOUSINE

lights the interior. The megaphone speaking tube with electric bell attachment connects with the driver's seat. A large, white rubber mat covers the floor. The body is made accessible by two steps with electric attachment on step to inform the driver. Racks to carry suit cases and light baggage are on the side of the car. The lighting equipment is one of the features on this model, which is electric and oil. A six-party switch, located on the driver's

seat, furnishes a combination of lights. Lamp and all equipment finished in bass and black enamel. The car is a special chassis model E Hart-Kraft, with a wheelbase of 123 inches, and is fitted with solid tires. The front wheels are 34-3½, the rear wheels 34-4. Front semi-elliptic and rear platform spring are used. Axles are drop forged and ball-bearing. The power is furnished by a Continental commercial truck motor 4½ by 5¼.

Mack Truck That Digs Holes and Plants Telephone Poles

THE International Motor Co. has just on the market a post hole digger and derrick. Briefly, the post hole digger and derrick consists of a 3-ton Mack chassis

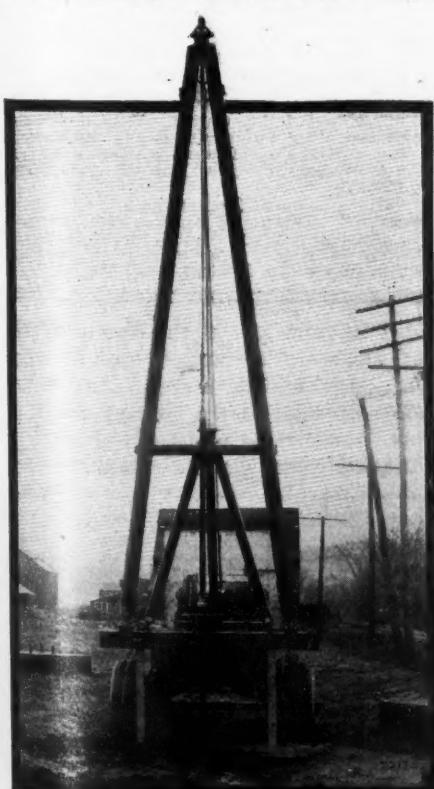
which is backed up to the curb or wherever the telephone, telegraph or electric transmission line is to be constructed and in 10 minutes or less with the use of its engine as power and the specially devised derrick and drilling apparatus, digs a hole 7 feet deep and then with the power of the engine, hoists the largest and heaviest pole and lowers it into the hole.

The platform of the rear of the truck is reinforced with heavy high beam and over rear end is erected a boom. This boom supports the drilling apparatus which is a modified carpenter's expansion drill. The drill is about 1 foot long and has a disk-shaped plate with tooth-cutting edge which throws up the earth as the drill bores into it. This disk also supports the core of loose earth and at a signal to the driver of the truck, the drill can be raised and drawn from hole by cable attached to standard winch operated by truck motor.

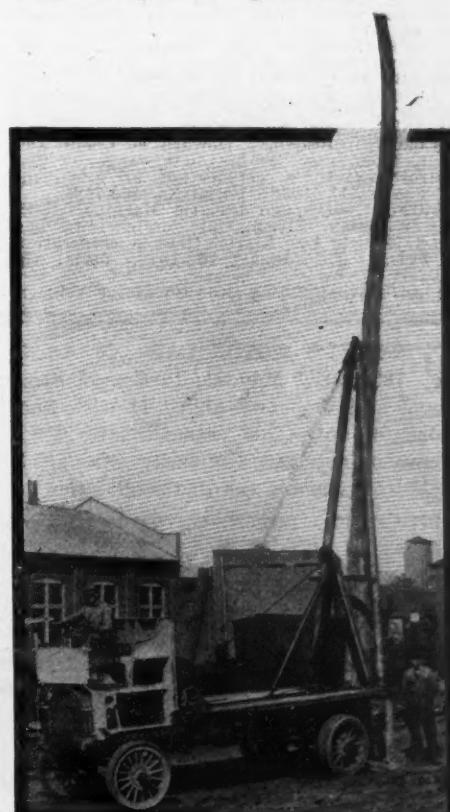
After the hole has been drilled and dirt removed, the chain is fastened about the pole to be set and in almost a jiffy the pole is hoisted and dropped into the hole that has been dug.

The money-saving possibilities of this device can be imagined from the fact that two men working together can dig about four post holes in a day and that it takes a very considerable gang of men, after the holes are dug, to set the poles and tamp the earth around. The Mack can haul the poles to the spot selected, dig the holes

and then set the poles. Not only is it a money-saver, but it is possible to set so many more poles in a given time.



TRUCK DIGGING POST HOLE BY ITS OWN POWER



TRUCK DROPPING TELEPHONE POLE INTO HOLE



Current Motor Car Patents



PATENTS ISSUED MAY 21, 1912.

1,026,662—Control of Vehicle Driving Wheels. Felix A. Eisner, Rochester, N. Y. Filed July 10, 1908. Serial No. 442,927.

1,026,667—Tire Inflation Mechanism. Royal F. Foster, Fort Riley, Kan. Filed November 26, 1910. Serial No. 594,350.

1,026,709—Motor Car Headlight. Conrad Sherman and Raymond Alfred Mallett, Sacramento, Cal. Filed November 22, 1911. Serial No. 661,750.

1,026,728—Steering Mechanism. Martin Williams, South Bend, Ind. Filed March 9, 1908. Serial No. 420,012.

1,026,732—Apparatus for Distributing Fuel in Internal Combustion Engines. Hans Th. Bruns, Nuremberg, Germany. Filed January 24, 1911. Serial No. 604,496.

1,026,749—Ball Cage for Ball Bearings. Hermann Kapper, Treptow, near Berlin, Germany, assignor to The Firm of Deutsche Waffen & Munitionstabriken, Berlin, Germany. Filed February 10, 1912. Serial No. 676,883.

1,026,783—Wheel. Walter Black, Mendota, Ill. Filed November 5, 1910. Serial No. 590,841.

1,026,803—Motor Car Tire. Ezra H. Hamilton, Willow Springs, Colo. Filed December 17, 1910. Serial No. 597,937.

1,026,810—Spring Wheel. Joseph Kuehl and Joseph Stefanowski, Detroit, Mich. Filed July 1, 1910. Serial No. 569,897.

1,026,812—Nut Lock. Andrew M. Lance, Batson, Texas, assignor of one-half to Amzi F. Haynie, Batson, Texas. Filed June 20, 1911. Serial No. 634,356.

1,026,813—Hinge Joint for Wind Shields. Peter N. Landine, Milford, Conn., assignor to The Rostand Mfg. Co., Milford, Conn., a corporation of Connecticut. Filed December 5, 1911. Serial No. 644,109.

1,026,822—Resilient Wheel. Frederick C. Oldham, Brooklyn, N. Y. Filed October 19, 1910. Serial No. 587,961.

1,026,826—Pitman Connection. Charles Pearson, Chicago, Ill., assignor to International Harvester Co., a corporation of New Jersey. Filed June 12, 1911. Serial No. 632,530.

1,026,827—Propulsion of Motor Vehicles. Henri Peper, Liege, Belgium. Filed January 23, 1911. Serial No. 604,225.

1,026,829—Vehicle Wheel. Knut A. Read, Oskaloosa, Iowa. Filed April 24, 1911. Serial No. 623,036.

1,026,836—Pneumatic Tire Fabric Having Annular Elastic Zones. Lawrence A. Subers, Cleveland, Ohio. Filed October 17, 1910. Serial No. 587,631.

1,026,847—Cover for Electric Batteries. Horatio J. Brewer, New York, N. Y. Filed October 21, 1911. Serial No. 655,880.

1,026,848—Electric Lighter for Gas Burners. Stewart Brown, Chicago, Ill. Filed December 30, 1911. Serial No. 668,624.

1,026,849—Bearing. Howard E. Coffin, Detroit, Mich., assignor to Chalmers Motor Co., Detroit, Mich., a corporation of Michigan. Filed April 13, 1908. Serial No. 426,758.

1,026,737—Dynamo Electric Machine. William W. Dean, Elyria, Ohio, assignor to The Dean Electric Co., Elyria, Ohio, a corporation of Ohio. Filed January 28, 1910. Serial No. 540,591.

1,026,851—Running Gear for Motor Vehicles.

David M. Dearing, Jackson, Mich. Filed November 12, 1909. Serial No. 527,625.

1,026,858—Pneumatic Tire for Vehicle Wheels. Louis Antoine Garchey, Paris, France. Filed June 29, 1910. Serial No. 569,801.

1,026,871—Internal Combustion Engine. Simon Lake, Milford, Conn. Filed March 21, 1911. Serial No. 615,992.

1,026,873—Plunger. William S. Locke, Los Angeles, Cal. Filed February 28, 1911. Serial No. 611,416.

1,026,889—Carburetor for Starting Internal Combustion Engines. Frank H. Walker, Lincoln, Neb. Filed April 21, 1911. Serial No. 622,597.

1,026,893—Pneumatic Cushion for Vehicles. Fred L. Baker, Orange, Mass. Filed November 17, 1911. Serial No. 660,936.

1,026,895—Radiator. Jacob B. Bean, Punxsutawney, Pa. Original publication filed February 16, 1911. Serial No. 608,944. Divided and this application filed July 26, 1911. Serial No. 640,656.

1,026,896—Radiator. Jacob B. Bean, Punxsutawney, Pa. Original application filed February 16, 1911. Serial No. 608,944. Divided and this application filed July 26, 1911. Serial No. 640,657.

1,026,903—Resilient Wheel. Louis Burdy and Emile F. Moine, Eureka, Cal. Filed June 14, 1911. Serial No. 633,032.

1,026,981—Motor Car Fender. Joseph Hadka, Chicago, Ill. Filed December 5, 1910. Serial No. 595,547.

1,027,023—Magneto. Ernest C. Wilcox, Meridian, Conn., assignor to The Connecticut Telephone and Electric Co., Meridian, Conn., a corporation of Connecticut. Filed December 17, 1908. Serial No. 467,956.

1,027,054—Atomizer for Liquid Fuel Motors. Joseph Leflaive, St. Etienne, France, assignor to The Societe des Moteurs Sabathé, St. Etienne, France, a corporation of France. Filed August 14, 1911. Serial No. 644,024.

1,027,056—Means for Advancing or Retarding a Magneto Shaft Relative to a Motor Shaft. Axel Levedahl, Aurora, Ill., assignor to Aurora Automatic Machinery Co., Aurora, Ill., a corporation of Illinois. Filed September 2, 1910. Serial No. 580,223.

1,027,087—Starter for Internal Combustion Engines. Cornelius Van Tubergen and Paul Westrate, Grand Rapids, Mich. Filed February 17, 1912. Serial No. 678,380.

1,027,088—Waterproof Battery and Method of Making Same. Ralph V. Villiers, East Freeport, Mass. Filed May 11, 1910. Serial No. 560,679.

1,027,092—Lubricating Device. Arthur J. West, South Bethlehem, Pa. Filed July 12, 1911. Serial No. 638,131.

1,027,105—Spring Wheel. George Crawford, New York, N. Y., and Thomas Veitch, Dumont, N. J.; said Veitch assignor to said Crawford. Filed January 21, 1911. Serial No. 605,675.

1,027,108—Tire Protector. William T. Dorgan, Akron, Ohio, assignor to The Standard Tire Protector Co., Akron, Ohio, a corporation of Ohio. Filed November 18, 1911. Serial No. 661,184.

1,027,130—Cushion Tire for Vehicles. Wesley S. Holmes, Ithaca, and Welcome B. Johnson, New York, N. Y., assignors to August

Zinsser, Jr., trustee, New York, N. Y. Filed February 18, 1910. Serial No. 544,601.

1,027,137—Knuckle Connection and Drive for Vehicle Wheels. Louis Mayer, Mankato, Minn. Filed May 5, 1910. Serial No. 559,544.

1,027,150—Lifting Device for Dumping Wagons. Charles Pay, Providence, R. I. Filed March 2, 1911. Serial No. 611,850.

1,027,151—Register for Pumps. William C. Pritchard, Lancaster, Pa. Filed February 13, 1911. Serial No. 608,267.

1,027,155—Attachment for Hose. Peter R. Robbins, Philadelphia, Pa. Filed September 5, 1911. Serial No. 647,576.

1,027,164—Valve Spring Lifter for Motor Car and Other Engines. Christian J. Wolff, Chicago, Ill. Filed February 23, 1911. Serial No. 610,311.

1,027,193—Vehicle Frame. Oliver Hazard Farver, Orrville, Ohio. Filed April 4, 1911. Serial No. 618,781.

1,027,196—Lamp. John H. George, Bridgeport, Conn., assignor to Hawthorne Mfg. Co., Inc., Bridgeport, Conn., a corporation of Connecticut. Filed March 16, 1911. Serial No. 614,783.

1,027,197—Drop Door Operating Mechanism for Dumping Cars. Edward W. Goodwin, New York, N. Y., assignor to Goodwin Car Co., Chicago, Ill., a corporation of Illinois. Filed June 23, 1910. Serial No. 568,429.

1,027,220—Wrench. Bert A. Stocking, Newton, Iowa. Filed June 1, 1909. Serial No. 499,512.

1,027,236—Change Speed Gearing. Horace M. Cade, Washington, D. C. Filed September 15, 1909. Serial No. 517,812.

1,027,247—Tire. George Gray, Sisseton, S. D. Filed October 28, 1911. Serial No. 657,221.

1,027,254—Oil Can. Felix Karpisek, Wilber, Neb. Filed August 18, 1910. Serial No. 577,474.

1,027,268—Transmission Gearing. George Washington Merleidt, Chicago, Ill. Filed September 16, 1910. Serial No. 582,292.

1,027,273—Dynamo Electric Machine. Lewis W. Nelson, Philadelphia, Pa. Filed May 16, 1910. Serial No. 561,546.

1,027,278—Internal Combustion Engine. Harry Ralph Ricardo, London, England. Filed November 11, 1910. Serial No. 591,810.

1,027,288—Cushioning Device for Vehicles. John C. Sherman, Brookline, Mass. Filed June 23, 1910. Serial No. 568,447.

1,027,293—Connecting Rod Bearing. Alfred T. Sturt, Flint, Mich. Filed November 16, 1910. Serial No. 592,729.

1,027,306—Motor Car Lamp. Percy C. Avery, Milwaukee, Wis. Filed February 4, 1911. Serial No. 606,594.

1,027,313—Reversing Gearing. Frank D. Bozarth, Williamsburg, Va. Filed September 12, 1911. Serial No. 648,951.

1,027,377—Friction Clutch. William Dennis, Milwaukee, Wis., assignor by mesne assignments to Verges Mfg. Co., Milwaukee, Wis., a corporation of Wisconsin. Filed May 15, 1911. Serial No. 627,179.

1,027,388—Short-Circuiter for Reversed Spark Generators. Thomas E. Madden, Indianapolis, Ind., assignor to himself and Jesse C. Hancock, Indianapolis, Ind., a copartnership. Filed April 4, 1910. Serial No. 553,313.

DIRIGIBLE MOTOR CAR—No. 1,026,709, dated May 21; to Conrad Sherman and Raymond Alfred Mallett, Sacramento, Cal.—This patent relates to a means of automatically turning the headlights of a motor car in the direction in

which the car is steered. As shown in Fig. 4, the lamps are mounted on pivoted brackets; there is a transverse rod T communicating between the two lamps to move them simultaneously in the same direction; and another rod R, hinged to the

rod T in front and at the rear to a vertical arm which is clamped to the steering rod of the vehicle, serves to move the rod T sidewise, as the steering rod S is moved to steer the vehicle.

Dean Dynamo-Electric Machine—No.

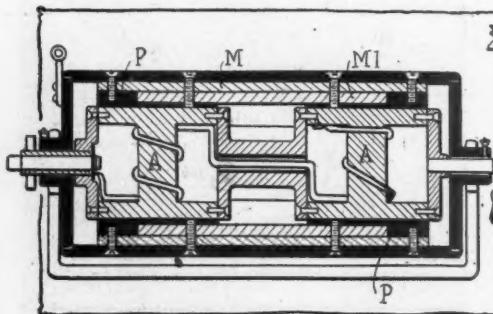


FIG. 1—DEAN ELECTRIC DYNAMO

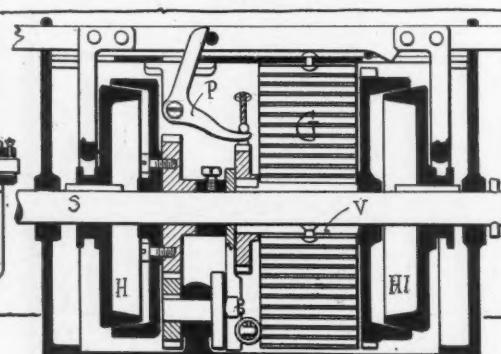


FIG. 2—MECHANICAL SELF-STARTER

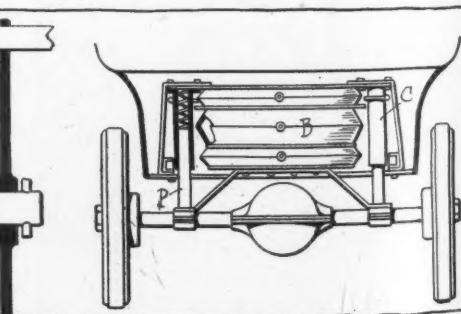


FIG. 3—PNEUMATIC BODY SUSPENSION

1,026,737, dated May 21; to William W. Dean, Elyria, O. As shown in Fig. 1, the Dean electric current generator comprises a closed casing, mounted to rock in trunnions. There are two bar magnets M and M₁ mounted inside of the casing and adapted to turn therewith, the inner ones being the shorter, so that the ends of the outer magnets M project beyond the ends of the inner magnets M₁. Pole pieces P are arranged between the ends of the magnets, and a pair of armatures A, which are rigidly fastened together, is mounted for rotation within the casing to cut the flux of the magnets.

Mechanical Self-Starting Mechanism—No. 1,027,087, dated May 21, to Cornelius Van Tubergen and Paul Westrate, Grand Rapids, Mich.—This starting mechanism, as illustrated in Fig. 2, comprises a heavy coil spring for starting the engine, and two clutches arranged on either side of the spring, one clutch designed to connect the spring to the engine shaft to turn it and the other clutch being provided to rewind the spring from the motor shaft after the engine is started. The spring, which resembles a heavy clock spring, is shown at G, its outer end being secured to the stationary casing and the inner end being attached to a sleeve V, which is loosely journaled on the shaft S. The female portion of the starting clutch H₁ is integral with the sleeve V to which the free end of the spring G is secured, and a ratchet wheel is keyed to the opposite end of the sleeve. There is a shifting bar at the top of the mechanism, and when this is shifted to the left, as indicated, the starting clutch H₁ is engaged, and the pawl of bell-crank P releases the ratchet, permitting the force of the spring to be exerted upon the shaft S to start the motor. When the motor is in operation, the shifting bar is moved in the opposite direction, releasing the clutch H₁ and engaging the ratchet pawl and the rewinding clutch H.

Pneumatic Suspension—No. 1,026,893, dated May 21; to Fred I. Baker, Orange, Mass.—This patent relates to a pneumatic rear frame or body support for motor cars, designed to replace the rear springs. As shown in Fig. 3, the mechanism comprises bellow-like, non-communicating air compartments, inflated to different degrees of pressure; means of securing the upper and lower compartments to the vehicle body and axle respectively, and telescoping compression devices arranged at either side of the inflated air compartments. The bellow-like pneumatic compartments B support the greater portion of the body weight, whilst the compression members, comprising coil springs arranged between the plungers P and cylinders C, serve to steady the body. The object of this construction is to increase the comfortable riding qualities of the car and perhaps do away with the necessity of using pneumatic tires, solid rubber tires being indicated on the wheels of the vehicle shown in the illustration.



Motor Car Questions Answered.

By the method of questions and answers a volume of no small value to owners, drivers and repairmen of motor cars is to be had in "Audel's Answers on Automobiles," by Gideon Harris and Associates. It is a book of general information for anyone practically interested in the operation of a motor car and is presented in a simple manner. The basis upon which the work is compiled is expressed in the following, taken from the cover of the book, "The thought is in the question; the information is in the answer." The different parts of the power mechanism of the car are taken up in chapters which are thoroughly cross-indexed so as to insure quick reference. Published by Theo. Audel & Co., London, Eng.; New York, N. Y.

Michigan's Motor Road Guide

Under the auspices of the Wolverine Automobile Club of Detroit is published the "Road Map and Motor Guide of Michigan," containing upwards of 500 pages of routings with mileage and running directions. Small sketch maps of twenty-four cities are scattered through the book while a half dozen multipartite multifold maps, including one of the city of Detroit, are appended. A hotel and garage directory is included; also very brief notes regarding the most important points of motor car laws in the states of Michigan, Ohio, Indiana, Illinois and Wisconsin. A club supplement furnishes the names and addresses of the officers, and sets forth the objects and a brief history of the organization. While the guide is gotten out under the direction of the Wolverine Automobile Club of Detroit, it is published by The Scarborough Co., Indianapolis, Ind. Price \$1.

Another Colorado Route Book

Colorado is logically making known to the motoring public the limitless attractions it has to share with all lovers of the out-of-doors. Under the authority of the Colorado state highway commission, "Highways of Colorado" is published by the Clason Map Co., of Denver, showing over 4,000 miles of state highways and

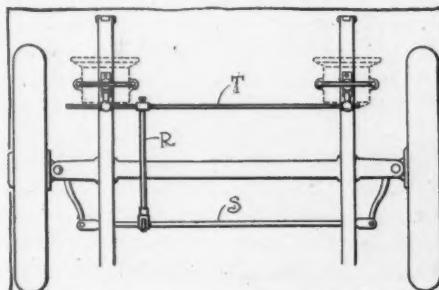


FIG. 4—DIRIGIBLE HEADLIGHT

10,000 miles of other county roads, with mileage, road conditions, descriptions and directions. Nearly half of the 192 pages of the book are devoted to maps, and the text pages are generously illustrated with many of Colorado's most famous and wonderful scenes. The different routes are identified by the preservation of the names applied to them when they were old, historic trails. The unique form of the volume, 10 $\frac{1}{2}$ inches by 3 $\frac{1}{2}$ inches, and less than $\frac{1}{2}$ inch thick, makes it exceedingly handy for reference, and is easily slipped into the coat pocket. The Clason Map Co., Denver, Colo. Price in tough paper cover \$1; leather, \$2.

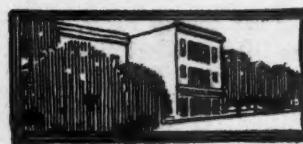
Physical and Chemical Constants

"Physical and Chemical Constants and Some Mathematical Functions," is the title of a valuable reference book. The data contained in this book is a collection of the more reliable determinations of some of the important physical and chemical constants, gathered during the teaching and laboratory experience of G. W. C. Kaye, B.A., Cantab., D.Sc. (London), A.R.C.Sc., and T. H. Laby, B.A., Cantab., Cambridge, professor of physics, Wellington, N. Z., formerly exhibition of 1851 scholar, Joule student, and research exhibitioner, Emmanuel college, Cambridge.

As the title implies, this volume includes in a systematic and well indexed manner, physical and chemical constants and mathematical functions most commonly used in general physics, astronomy, etc. The material is arranged under the heads of heat, sound, light, electricity, magnetism, radioactivity and gaseous ionization, and chemistry and mathematical tables. The authors have dipped into astronomy, engineering, and geology, only in so far as they border on physics and chemistry. Considerable space has been allotted to radioactivity and gaseous ionization, and it is believed that, as this is perhaps the first collection of data of its kind, it will be of assistance to the numerous workers in a field whose phenomenal and somewhat transitional growth is a little dismaying from the present point of view. Published by Longmans, Green & Co., London, New York, Bombay and Calcutta.

Hotel Directory

The John Willy Hotel Directory, covering the United States and Canada, has been compiled from information gathered from bankers in towns of 1,000 population and upwards, and from the hotels themselves regarding plan and rates. It is the intention of the compilers of this directory that it shall assist the traveler to know the class of hotel and the rates charged by each, in fact, that it shall be in form to be of genuine assistance to the traveling public. With a yearly revision, which is evidently the plan as the 1913 edition is already under way, the data should be the latest possible that may be obtained. Published by The Hotel Monthly, Chicago, Ill. Price \$1.



Among the Makers and Dealers



GEORGE A. BRINKMAN MOTOR CAR CO., ST. LOUIS, MO.

Probst with Kanawha—Karl Probst, formerly of the Lozier, Peerless and Seagrave companies, has been appointed general manager with the Kanawha Auto Truck Co., Charleston, W. Va.

Reynolds Promoted—C. S. Reynolds, of South Bend, has been appointed purchasing agent of the Studebaker Corporation, motor car division, Detroit, Mich., in the place of F. A. Wade, resigned.

Wood New Manager of Midland—Frank B. Wood, for the past several months superintendent of the Midland Motor Co. of East Moline, Ill., has been made manager of the plant, succeeding J. M. Dale. Mr. Wood came to the Midland company shortly after the organization had been taken over by the Deere interests.

Tyler Out of United Motors—Changes have just been announced in the management of the United Motors Boston Co. that proved somewhat of a surprise to the Boston colony. Manager F. J. Tyler, who has been at the head of the Boston division for some time, and who before that handled the Maxwell agency as an agency and a branch for some years, has resigned. Lucius Tyler, his brother, who has been connected with the company a long time also, while he has not made any announcement, may retire also. F. J. Tyler had general charge of all the United Motors Co. products except the Columbia, and Lucius Tyler managed the Maxwell branch. Ernest H. Brandt has been sent to Boston as supervisor of the New England branches with headquarters in Boston. Manager Ralph Coburn, of the Stoddard-Dayton,

has been made manager of the United Motors Boston Co., and A. W. Mutty has been transferred to the management of the Stoddard-Dayton.

Iowa to Have a Show—Iowa will have a motor show in connection with the state fair, which is to be held in Des Moines the last week of August. W. E. Moyer, C. G. Van Vliet and George Harritt are managers of the show. The show will be staged in the fireproof arena beneath the immense amphitheater at the fair grounds.

De Arnold Retires—W. de Arnold has withdrawn from the Rassel Motor Car Co. of Toledo and will devote his entire time to the organization of the De Arnold Mfg. Co., for the purpose of manufacturing motor trucks. His work with the Rassel Motor Car Co. for the past 4 months has been for the purpose of straightening up the affairs of the old company, and putting it in a position that it might be absorbed by the new corporation. He has given up hopes of acquiring the old plant and now all negotiations have been declared off.

Franklin Prosperity—Greatly increased sales in several of the largest American cities, picked at random from all sections of the country, are the basis for a prosperity story emanating from the offices of the Franklin Automobile Co., Syracuse, N. Y. In ten cities—Boston, Philadelphia, Chicago, St. Paul, Providence, Cincinnati, Cleveland, Buffalo, New York and San Francisco—sales for 1912, with 3½ selling months still remaining in the present year, are 150 per cent greater than were the sales for the entire fiscal year of 1911.

These sales increases range from 86 per cent in Boston to 500 per cent in Cincinnati and the average increase in twelve of the leading American cities is 105 per cent.

Annin Makes a Change—H. K. Annin, until recently engaged in commercial engineering work with the engineering department of the National Electric Lamp Association at Cleveland, has left this post to assume the management of the Elux Miniature Lamp Works of the General Electric Co. in New York city.

Illinois Dealers Meet—At the monthly meeting of the Automobile Dealers' Association of Illinois, held at Jacksonville, ten new members were reported. The association will devote its energies to securing pledges from candidates before the people of Illinois this year, that they will promote good roads and allow an appropriation equal to that of the license money received from cars to be used in the construction of main highways across the state. It was voted to hold the meeting next month in Peoria, the date being June 18.

Overland Plant Growing—The Willys-Overland Co. has let the contracts for \$40,000 worth of additions to its already immense plant in Toledo. Beside the additions to the factory proper additional office space is being provided, as the present quarters are becoming badly cramped. There will be three buildings, one a three-story structure of reinforced concrete, 92 by 162 feet, to cost \$22,000. In addition to this there will be a one-story brick building 68 by 82 feet, to cost \$800 and a one-story concrete building 41 by 30 feet which it is estimated will cost \$4,800.

Blacksmith Builds Odd Car—A queer exhibit at the recent Oswego (N. Y.) show was by a blacksmith. Claude Rivett, from Scriba Corners. It was a motor car he had constructed himself from odds and ends and he called it the Rivett Special. It resembles a large wheelbarrow, having two wheels in front and one behind. It was put together with a hammer, a monkey-wrench, a screw driver and a saw—and it looked it. It has two speeds forward, but no reverse. The batteries are in an old coverless box under the seat and the flywheel is exposed, projecting through the floor of the car. The two-cylinder engine, not occupying all the space under the hood, the maker stores a tin pail, funnel and other articles under there. The motor is water-cooled, coils of pipe showing through the chicken wire stretched over the hood. There is chain-drive, the chain being big enough for a truck. An old packing box furnishes the body and there is no paint or cushions. The two front wheels have iron rims and the rear wheel the remnants of a rubber

tire. The thing actually runs and at a speed of 15 miles an hour. Its owner values it at \$75.

Sandusky Plant Enlarging—The plant of the Sandusky Auto Parts and Motor Truck Co., at Sandusky, O., is to be enlarged and 250 more men employed. A deal was recently closed to furnish 2,300 motors for one concern.

Smith Opens Chicago Branch—The A. O. Smith Co. of Milwaukee has established a general sales office at 2328 Michigan avenue, Chicago, for the marketing of the new Smith Milwaukee truck. C. W. Babcock will be in charge.

Ohio Established in Canada—Only two votes were cast against the by-law granting to the Canadian Ohio Motor Car Co. a free site and exemption from municipal taxation for a period of 10 years in Coborne, Ont. The company will forthwith begin the erection of a factory building 60 by 400 feet in which to manufacture motor cars.

Klaxon Makers Increase Capacity—The Lovell-McConnell Mfg. Co., of Newark, N. J., is making extensive additions to its manufacturing facilities. The power plant is being enlarged to more than double its present capacity; additional land has been purchased to admit of further expansion in other departments; and new machinery has been installed.

Wants Freight Rates Readjusted—The Wadham's Oil Co. of Milwaukee, one of the largest middle western independent oil companies, with branches in twenty-six cities, has filed complaint against the Pittsburgh and Lake Erie and other common carriers to obtain a readjustment of freight rates from Pennsylvania to Milwaukee. The present rate on petroleum from Coraopolis and Neville Island, Pa., to Milwaukee is 18 cents per 100 pounds in carload lots, and this is declared to be unreasonable and

exorbitant. The complaint asks the interstate commerce commission for a readjustment and reparation for excess.

Marburgs Moving—Marburg Brothers, Inc., handling Mea magnetos and S. R. O. bearings, will move to the eighth floor of the United States Rubber building, corner of Fifty-eighth street and Broadway, New York city.

Truck Concern Buys Building—For a consideration of \$350,000 the General Industrial and Mfg. Co. has purchased the Laycock Industrial building in Indianapolis. The building has 380,000 square feet of floor space and is located at West Tenth street and the canal. Several manufacturing concerns have quarters in the building. The new owner was organized some months ago to manufacture a line of gasoline motor trucks.

Four-Wheel Drive Not to Move—The Oshkosh Chamber of Commerce is advised by W. A. Olen, president of the Four-Wheel Drive Automobile Co. of Clintonville, Wis., that the company is not contemplating removal of its plant from Clintonville. It has been reported on good authority that negotiations are going on with the Business Men's Association of Appleton, Wis., for removal to Appleton. The Four-Wheel company says: "We have no intention of making a change in our location."

Rules on Tire Guarantee—An important decision was handed down in common pleas court of Toledo by Judge Chittenden, when it was decided that a rubber manufacturing company is liable for a guarantee given on a motor car tire. A jury awarded Attorney A. S. Brumback a verdict of \$49.50, the full amount asked in his suit against the Michelin Rubber Co., of Cleveland, to recover on two tires which he alleged were defective. The company guaranteed the tires to withstand 3,500 miles of travel and

Mr. Brumback alleged that he had used one but 1,700 miles and the other but 35 miles.

Hartford Wants Bosch Plant—The Hartford Board of Trade, having learned that the officials of the Bosch Magneto Co. are dissatisfied with their present location near Springfield, Mass., has started out to try to induce the company to move to Hartford, Conn., where a splendid location could be secured in the southwest part of the city in the factory district.

Wall Wins Rambler Prize—The Thomas B. Jeffery Co. has announced that E. J. Wall, manager of the Boston Rambler branch, is awarded first prize in the salesmen's contest in which 150 salesmen throughout the United States and Canada participated. G. B. Muma, Canadian representative, won second prize, with twenty-one sales of the Cross Country Rambler in 2 months' time.

Thomas Branch in Los Angeles—The E. R. Thomas Motor Car Co. of Buffalo has established a factory branch in Los Angeles. The branch was not only established for the making of retail sales, but a complete supply of all parts in Thomas models will be maintained. The new Thomas branch is located at the corner of Eleventh and Flower streets and is in charge of A. M. Young, branch manager.

Boston's Used Car Show—Boston's first show for used and renewed cars will open at the Arena June 5 and run for a week. Interested in the outcome of it. A meeting of members of the Boston Automobile Dealers' Association was called to consider the matter of taking space, but it was voted not to enter the show. A few of the dealers were in favor of it, but the majority opposed it as an organization. The vote of the association, however, did not bind any member from taking space as an individual.



NEW HEADQUARTERS OF THE OLDSMOBILE COMPANY IN MINNEAPOLIS

Development Briefs

Daisy Electric Gas Lighting System—New Gasoline Filter—Wohlfeld Tire Trunk—MacKae Terminals for High-Tension Wires—Arsenal Velvet Gloss

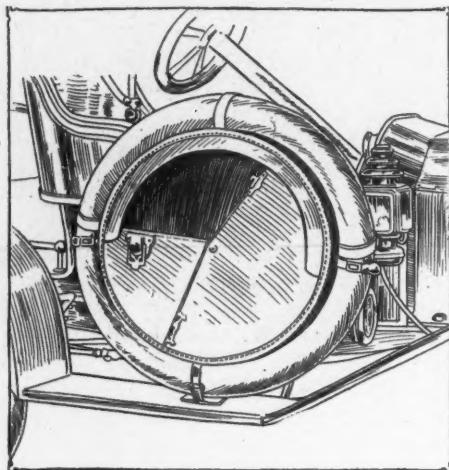


FIG. 1—WOHLFELD'S TIRE TRUNK

New Gasoline Filter

THE prevention of dirt or other extraneous substances is one of the necessities of perfect carburetor operation, and for this purpose a filter of some sort is necessary in the gasoline line. The pure gas inner filter illustrated in Fig 4 and manufactured by the Pure Gas Filter Co., Fort Wayne, Ind., is designed to prevent dirt from entering the carburetor. The inner filter is built on the same lines as have been a proven success for years in filters of other styles.

Daisy Electric Gas Lighting

The inconveniences of acetylene gas as a motor car illuminant lie chiefly in the necessity of getting out of the car and scratching matches to ignite the gas. To remove this objection for the use of acetylene gas there have been developed several systems of electric ignition by a spark at the burner on the same principle that the gas in the engine cylinder is ignited.

The Daisy electric system for lighting acetylene lamps has been brought out by the Simkin Mfg. Co., Chicago. Its chief elements are illustrated in Fig. 2. The principal feature to this system is that it utilizes the magneto current for igniting the acetylene. The Daisy controller is shown at the right and is designed to regulate the flow of gas to the lamp. It contains a switch for producing a spark at the headlight igniter. The gas is turned on by a valve C of the controller. Piping is led from this controller to the burner and there is also led from it to the burner by electric high-tension wires terminating in a platinum spark gap over the point at which the gas issues from the burner.

The controller is composed of two sec-

tions, the gas transfer ports and valves and the electrical portion, which consists of a wire from the magneto and thence to a switch A, which, if pressed, breaks the circuit from the magneto terminal to the spark plug and connects the magneto wire to the headlight igniter and throws it in operation. The magneto is normally short circuited through the controller except when the button is pressed, at which time the headlight igniter is thrown into the magneto or battery circuit long enough to supply a spark which will light the lamps.

Wohlfeld's Tire Trunk

In Fig. 1 is illustrated the latest addition to the line of tire trunks manufactured by Wohlfeld Trunk & Bag Co., Philadelphia, Pa. Its feature is the construction of the door by which it is made water and dustproof. The outer side is cut on nearly a straight line on its diameter, one half being stationary and the other half revolving on a hinge about the center so that to open the trunk it is merely necessary to swing one half about the other. The upper portion is the movable part and the outer edge is protected by a flap turned over from the edge to close the gap at the circumference. The trunk is provided with a latch to keep it closed, and the latch may be locked if desired. The construction of the trunk includes such materials as basswood and board covered with black enameled duck and all edges bound with leather.

Arsenal Velvet Gloss

A new dull or matt finish for motor cars is supplied for the amateur painter by the Arsenal Varnish Co., Rock Island, Ill. It is called Velvet gloss and is made in

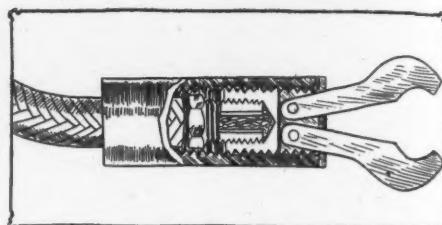


FIG. 3—MAC-KAE PLUG TERMINALS

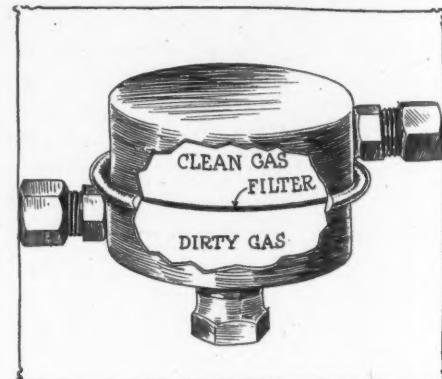


FIG. 4—PURE GAS FILTER

four different colors. The chief advantage of the finish is that it can be applied in 2 days and the car can be used on the third day.

Mac-Kae Terminals

Plug terminals for high-tension wires are usually so constructed that it is necessary to entirely remove the binding screw if the plug is to be disconnected. A terminal which will allow disconnection of the plug while the motor is running is the Mac-Kay terminal, made by the Mac-Kay Mfg. Co., Boston, Mass. The construction is illustrated in Fig. 3, in which it will be seen that the gripping portion of the terminal is two metal jaws hinged at their inner end. Over these projects the end of an internally threaded hard rubber sleeve. These jaws can be opened or closed by simply twisting the hard rubber sleeve. It will be noted that the opening in the brass jaws is elliptic in form to give a secure hold on the thread

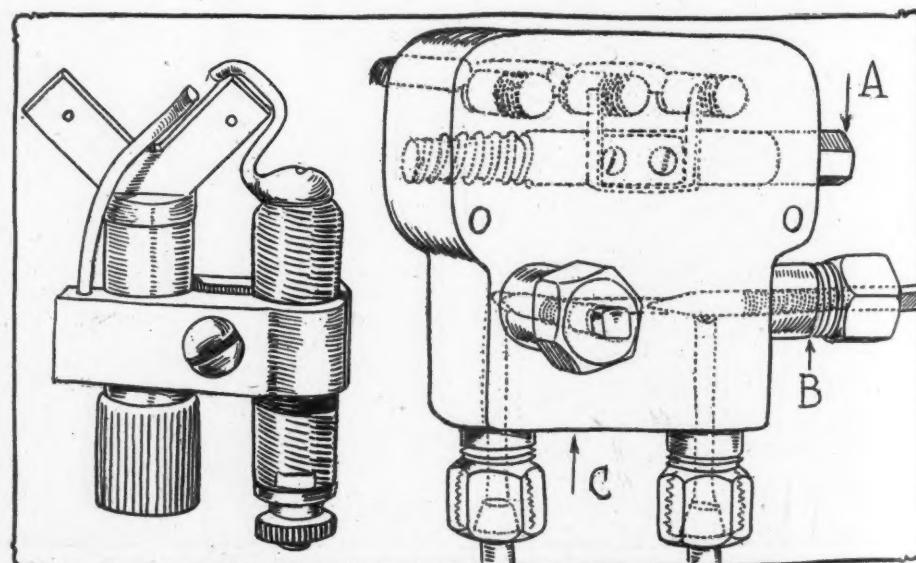


FIG. 2—FEATURES OF DAISY GAS-LIGHTING SYSTEM

Novelties for Motoring

Saunders Gearshift Lever Lock—Dewey Impulse Air Pump—Crankless Engine-Starter Puts Acetylene Gas in Manifold—Some of the Latest Accessories

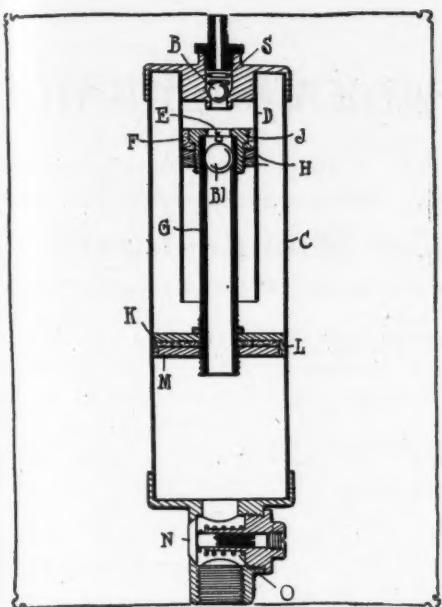


FIG. 5—DEWEY TIRE PUMP

of the plug electrode in case the top nut is lost. When the jaws are fully expanded the terminal will give secure contact on a plug with the top cap in case the threaded post is broken off.

Gearshift Lever Lock

Several suggestions have been given from time to time as to how a car can be left so it cannot be used without the owner's consent, and among these are lock switches and lock caps for gasoline. Another method which has come into favor is that of locking the gearshift lever into neutral position so that it is impossible to throw the gears into mesh. Such is the Saunders lever lock made by F. H. Kelsey & Co., Cleveland, O. As shown in Fig. 7, it consists of a bracket placed on the gearshift lever in which there is a sliding tongue which can be easily lifted up out of connection with the gate or dropped down to the gate so that it prevents movement of the lever. As it can only be dropped into position when the lever is at neutral point, there is no possi-

bility of locking it in any other position. A hinged bar, one-half of which is on each side of the lever, can be swung either into or out of engagement with the tongue, and when in engagement the tongue cannot be moved. A padlock passed through holes in the two halves of the bar lock it in the latter position.

Dewey Tire Pump

Another impulse tire pump has appeared on the market. This is the Dewey tire pump illustrated in Fig. 5 and made by the Dewey Anderson Co., Toledo, O. This pump is intended to be attached to the cylinder and depends for its operation upon a part of the suction and explosion stroke of one of the engine cylinders. In Fig. 5 the outer brass cylinder C contains the air cylinder B, the piston with the brass head J, threaded lock nuts H, which act as piston guides, and two ball check valves B and B1. F is the air cup leather and E is the pin stop for the ball check valve B1. G is a piston rod of brass tubing as on it is a metal disk K threaded on the inside to screw up against the large leather washer L which surrounds the metal washer N. Air is allowed to pass into the chamber of the motor during the suction stroke through the breather valve N. On the suction stroke the pump piston is drawn downward, allowing air to be drawn into the breather valve through the hollow piston rod and past the ball check valve B1, filling up the air chamber above the piston J. On the compression stroke of the motor the piston starts upward, and as soon as this occurs the ball check valve B1 opens and

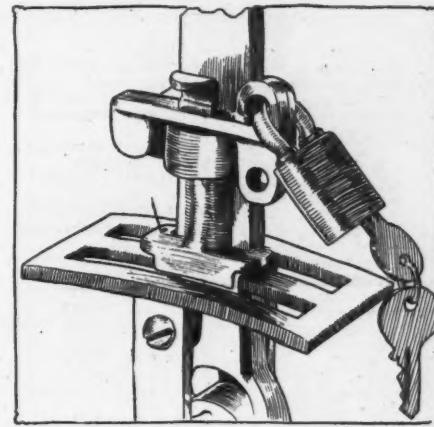


FIG. 7—SAUNDERS LEVER LOCK

so that only pure air is pumped into the tire. The danger of getting oil into the gases in the lower cylinder as soon as the piston starts on its upward stroke, it will be noted that the air which is in the upper cylinder is entirely shut off from the air in the chamber is forced out into the tire hose through the check valve B. tires is avoided because the only wearing parts are the two leather cup washers, and no lubricant is necessary.

Crankless Starter

Acetylene engine-starting arrangements still are appearing in a variety of forms. One of the latest of these is the Cox crankless self-starter manufactured by the Cox Brass Mfg. Co., Albany, N. Y. The arrangement is illustrated in Fig. 6, wherein it will be seen that a twin gas connection is installed at the storage tank providing a lead for lights and one for the starter, which is led to the starter body or the dash. This consists of an air-intake valve and mixing chamber, so that when the pushbutton A on the other side of the dash is pressed a correct quantity of air is mixed with the acetylene and the whole transmitted to the intake manifold. The starter is operated in the following manner: The operator presses forward a small pushbutton located on the dash, which cuts out the ignition and opens two small valves in the starter, allowing the motor to draw into the cylinders through the inlet manifold acetylene gas and air on its dying revolutions. This charges the cylinders with a mixture ready for the next start, the motor being started in the usual manner of starting on the spark. In case the car is not equipped with starting button on the coil, a mechanical vibrator is supplied for use in connection with the starter. It is claimed that the average cost of each start amounts to about 1/25 of 1 cent.

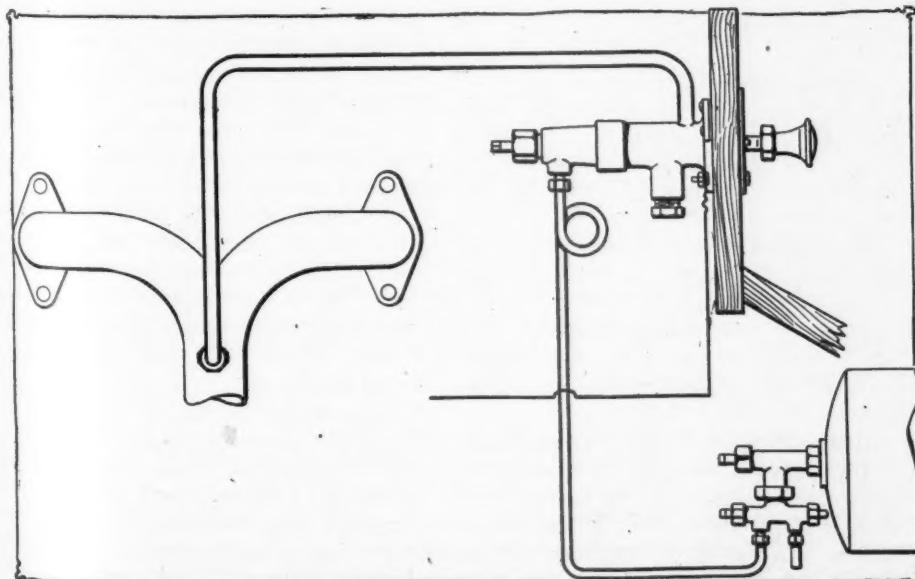


FIG. 6—CRANKLESS ACETYLENE MANIFOLD STARTER



Brief Business Announcements

Recent Agencies Appointed by Pleasure Car Manufacturers

Town	Agent	Make	Town	Agent	Make
Bay Shore, N. Y.	Bay Shore Auto Co.	Cole	Patchogue, N. Y.	Bellman Auto Co.	Cole
Babylon, N. Y.	George Haab.	Cole	Philadelphia, Pa.	Henry A. Rowan, Jr.	Cole
Birmingham, Ala.	Northern Automobile Agency	Cole	Peoria, Ill.	C. W. Robinson & Co.	Cole
Boulder, Colo.	William Arnstead.	Cole	Richmond Hill, N. Y.	J. T. Kernockan.	Cole
Bridgehampton, N. Y.	Charles Rogers.	Cole	Rockville Centre, N. Y.	Gardner's Garage.	Cole
Clovis, N. Mex.	D. B. Oldham.	Cole	Rutland, Vt.	Rutland Garage Co.	Cole
Coram, N. Y.	Lester H. Davis.	Cole	South Jamesport, N. Y.	J. Edwards.	Cole
Centre Moriches, N. Y.	S. S. Roberts.	Cole	Stratton, Alta.	H. A. Calder.	Cole
Cleveland, O.	Bingham Motor Car Co.	King	Can.	Smithtown Auto Co.	Cole
Good Ground, N. Y.	C. S. Vail.	Cole	Syracuse, N. Y.	W. R. Pierce.	Baker
Houston, Tex.	H. S. Reavis.	King	Vassar, Mich.	B. H. Clark.	Cole
Huntington, N. Y.	Suffolk Electric Co.	Cole	Westport, Conn.	Westport Garage.	Cole
Johnston, Pa.	Park Auto Co.	Cole	Washington, D. C.	C. G. R. Cowie & Co.	Cole
Huntington, Ind.	John H. Miller.	Cole	Wabash, Ind.	James T. Watson.	Cole
Lindenhurst, N. Y.	A. Warta and Brothers.	Cole	Westhampton Beach, N. Y.	D. H. Looze.	Cole
Long Island City, N. Y.	Seymour Taft.	Cole	Waco, Tex.	Chapman Tire and Rubber Co.	Cole
Moro, Ore.	W. H. Moore.	Cole	Wichita Falls, Tex.	A. Marcus.	Cole
Northport, N. Y.	Northport Lumber and Coal Co.	Cole	York, Pa.	T. S. Pfeiffer.	Hupmobile
Port Jefferson, N. Y.	A. N. Randall.	Cole			
Peconic, N. Y.	Nathan H. Sayre.	Cole			

McLEOD, ALTA.—Neil McCaig has purchased J. R. Dilworth's garage.

Milwaukee, Wis.—A. O. Schrader, 202 Third street, has been appointed Milwaukee agent for the Enger 40.

Strathcona, Alta.—Work will commence at once on the erection of a garage to cost \$24,000, which is being put up for Edinger Co.

Beloit, Wis.—A. B. Gardner has been appointed superintendent of the mechanical department of the Alamo Gas Engine Co., of Hillsdale, Mich.

Rock Island, Ill.—The Tri-City Auto Supply Co. has been organized and opened for business at 319 Nineteenth street. The business is limited to motor supplies and accessories.

San Francisco, Cal.—C. S. Richardson has sold out his interests in the Reliance Automobile Co. He will hereafter be interested in the Punctureless Tire Co., having houses in both San Francisco and Los Angeles.

Brockton, Mass.—At a meeting of the creditors of the Leighton Automobile Co. it was agreed that the business be closed out as soon as possible. The largest and principal creditor is the Leighton estate, owner of the property.

Indianapolis, Ind.—Jacob Moffatt, W. H. Disher and A. G. Balfour have organized the Automobile Resilient Tire Filler Co. The new company is incorporated and has a capitalization of \$10,000. A factory is to be established here at once.

Pittsburgh, Pa.—A Delaware charter has been secured by the Combination Steel and Pneumatic Tire Co., of Swissvale, the capital being \$200,000. The incorporators are W. K. Weaver, W. A. Knorr, Swissvale and W. H. Kider, Wilkinsburg.

The company will deal in all kinds of pneumatic tires.

York, Pa.—S. F. Famous, 409 West Market street, has gone into the accessory business.

East Jaffrey, N. H.—Wellington & Webster have leased the Coburn shop and have turned it into a garage and repair shop.

Concord, N. H.—Norris A. Dunkee, a veteran stable-keeper, has given up his horse livery business and opened a garage on South Main street.

Buffalo, N. Y.—Joseph F. Rath has accepted the general management of the Chevrolet-Detroit branch which will be opened in Buffalo in a few weeks.

Gloucester, Mass.—A large addition has been built to the garage owned by J. N. Dorley, Washington street, giving a floor space of about twice the size of the old structure.

Boston, Mass.—There is a rumor of the Lenox Motor Car Co. moving its plant from the present location in Jamaica Plain to Whitman, Mass., as much of the capital of the company is owned by men in that town and Brockton.

Philadelphia, Pa.—Edward G. Oliver has been appointed eastern district manager of the Metzger Motor Car Co. Headquarters for the middle Atlantic states territory of the recently organized company will be established in Philadelphia in the near future.

Auburn, Ind.—New appointments by the W. H. McIntyre Co. are: B. B. Traub as eastern trade solicitor, with headquarters at New York, his territory being east of Buffalo and north of Virginia; H. H. Thorpe, agent at Portland, Ore., to cover the states of Oregon and Washington;

and W. S. Crowder for Springfield, Ill., and vicinity.

Farmington, Me.—The Spinney garage has been leased by Fred D. Jordan.

Davenport, Ia.—Steinhauer & Wheaton, 320 West High street, have been appointed agents for the Michigan.

Montreal, Que.—The Pope-Hartford Motor Co. of Canada has taken possession of its new salesroom and service office at 317-319 University street.

Ottawa, Ont.—The Auto Tire Co., Canadian selling agent for Goodrich tires, has opened a branch salesroom in this city at 42 Bank street, under the management of L. C. Benson.

Green Bay, Wis.—A. W. Case, Jr., has been appointed district manager for the Oakland-Wisconsin Motor Car Co. in the entire northeastern territory, with headquarters at Green Bay.

Whitewater, Wis.—The Place & Colby garage was badly damaged by fire caused by carelessness with matches near gasoline in open vessels. The adjoining garage of the Taft-Pratt Co. was damaged also. The building is owned by W. J. Taft.

St. Louis, Mo.—The Wesco Supply Co. will act as distributor of Hagstrom spark plugs and other Hagstrom specialties. The Wesco company has branch houses at Birmingham, Ala., and Fort Worth, Texas, and men covering the entire south.

Lynn, Mass.—The V-C truck, now on the Massachusetts market, is the product of the V-C Motor Truck Co. This company was formed at Lynn, Mass., by Frank Valier and Frank Corlew, of Boston, the latter having sold his interest in the Grant Motor Truck Co., of Cambridge, Mass. The new company will build a light truck at

first and if conditions warrant it other sizes will be added.

Scott, Sask.—The Luse Land Co.'s garage has been purchased by William Hook.

Vancouver, B. C.—The Ford Motor Co. now occupies its new garage at 1129 Howe street.

Chicago, Ill.—E. W. Arbogast has been appointed head of the commercial car department of the local Studebaker branch.

Montreal, Que.—The Canadian Consolidated Rubber Co., Ltd., has built a large garage in connection with its factory and warehouse at Montreal.

Akron, O.—Contracts have been awarded for a two-story brick and steel factory and office building for the Akron Rubber Machine and Mould Co.

Boston, Mass.—The Charles A. Jackson Co., agent for the Apleo lighting system, has moved into new quarters on the second floor of the Motor Mart in Park square.

San Francisco, Cal.—Stanley W. Main has gone into partnership with Ben W. Copeland, and they will carry on the retail business formerly operated by the W. D. Newer Rubber Co.

Pittsburgh, Pa.—The foundation has been about completed for a \$30,000 commercial garage at Collins avenue and Station street, being erected by the Tabernacle Presbyterian church, of this city. It will be a two-story brick, steel and concrete affair on a lot 96 by 128.

Albany, N. Y.—The Boulevard Garage Co., has been organized with a capital of \$50,000. The directors include Morris L. Ryder, Samuel W. Whitney, Horace A. Raynor, Oscar F. Kinney, Horace S. Bell, Thomas R. Ward, Jr., Leonard G. Staley, Frederick E. Wadham and William S. Hackett.

Webster, S. D.—The Tyner Garage Co., in addition to handling motor cars, motor cycles and supplies at retail, has opened a wholesale department and will handle the northern half of South Dakota and southern half of North Dakota. It handles the Detroiter as distributor for South Dakota this year.

Des Moines, Iowa—C. A. Herring, Iowa distributor for the Ford car, announces the construction of a \$50,000 brick building to house the Herring Motor Co., the Herring Motor and Supply Co. and the Iowa assembling plant of the Ford company. The location will be on trackage in the Des Moines wholesale district.

Indianapolis, Ind.—The Globe Realty Co. has let contracts for an addition to motor row in North Capitol avenue. The new building will be three stories high, 120 by 136 feet, and of reinforced concrete construction. The entire first floor will be occupied by a company that will handle the Packard and Stutz. The Prest-O-Lite Co., the Indianapolis Motor Speedway Co.

and Carl G. Fisher will also have offices in the building.

Brodhead, Wis.—A. L. Allen will erect a three-story fireproof garage, 44 by 110 feet, at Brodhead, Wis.

New London, Conn.—N. V. and H. N. Porter, agents for the Maxwell, have just opened a new garage at 416 Bank street.

Elko, Nev.—A. W. Hessen & Co., of this city, are constructing a large garage. James Warden has been engaged as manager.

Spencer, Mass.—Ground has been broken for a garage to be built by James H. Quinn, proprietor of the Massasoit hotel.

Buffalo, N. Y.—The McClurg Tire Co., of Boston, Mass., has established a branch office at 873 Main street, under the management of J. L. McClurg.

Tacoma, Wash.—The Kum and Go Automobile Co. has been incorporated in Tacoma by Otis Cutting and Charles Atherton. The latter will act as manager.

Salt Lake City, Utah—The Sterrett Electric Co. has opened an electric garage at 26 South Fourth street, East Salt Lake City. L. G. Sterrett is the manager of the new concern.

Moline, Ill.—Charles Mason has been placed in charge of the publicity department of the Midland Motor Co. The Midland plant has resumed operations again, following a week's shut-down.

Waterville, Me.—Keene & Kimball, proprietors of the garage on Burleigh street, are having an addition built to the present quarters, in which a machine shop and nickel plating plant is being installed.

Milwaukee, Wis.—The Franklin Auto and Supply Co., 321-323 Fourth street, Milwaukee, is doubling the size of its garage, repair and salesroom by adding the building at 325-327 Fourth street. The company represents the Franklin, Regal and Alco.

Minneapolis, Minn.—B. W. Davenport, vice president and chief engineer of the Dispatch Motor Car Co. of Minneapolis, has disposed of his entire interests in the company and for the present will devote himself to the development of a new friction drive of his invention.

Louisville, Ky.—The Commercial Motors Co., with an authorized capital stock of \$10,000, has filed articles of incorporation in the county clerk's office. The incorporators are: Harry B. Fitch, R. J. Hurt and R. E. Scharf. The concern will buy, rent and sell motor cars.

Akron, O.—The Goodyear Tire and Rubber Co. has completed plans for another large building to be built in connection with the present group. It will be 400 feet long and 79 feet wide. Building No. 13 is to be remodeled and an additional two stories will be added. This

building at present is 296 feet long and 79 feet wide.

Driggs, Idaho—The Driggs garage has been opened in this city under the management of H. G. Winger.

Syracuse, N. Y.—Joseph McCarthy is erecting a large fireproof garage at the corner of Hawley avenue and McBride street.

Detroit, Mich.—The King Motor Car Co. has made arrangements with S. J. Wise & Co. to handle the New England business.

Montreal, Que.—The Rubber Tire Wheel Co., representing Fisk and Kelly-Springfield tires, will remove to enlarged uptown quarters on Park avenue.

Orangeville—F. H. Doherty has purchased a block on Broadway and intends opening a garage. He will also handle the Reo and Ford cars and a line of motor trucks.

Syracuse, N. Y.—Frederick J. Haynes has resigned as Franklin factory manager to accept an important post with Dodge Brothers, of Detroit, manufacturers of motor car parts.

Northampton, Mass.—The new garage being built for Frank S. Parsons, agent for the Reo, is being completed rapidly and will afford much better facilities as it will have a space of 36 by 50 feet.

Pittsburgh, Pa.—The Auto Supply Co., with a capital of \$50,000, has been granted a state charter. The incorporators are W. C. Coffin, E. N. Ohl, E. J. Taylor, C. A. Jones and J. E. Lauck, all of Pittsburgh.

Milwaukee, Wis.—Richard Gove, general manager of the Jackson Motor Sales Co. of Milwaukee, has resigned and withdrawn from the firm. He is succeeded by John F. Tellier. The garage and salesrooms are located at 523 East Water street.

Baltimore, Md.—The Beehler & Ogden Motor Co. is to have a service station in connection with its new showrooms and garage on Lexington street near Carey. The company represents the Krit car in Baltimore and the state of Maryland.

Welland, Ont.—The Canadian Cataract Rubber Co. has applied for incorporation with a capital of \$200,000, and will locate a plant at Welland. The officials are E. J. M. Block, J. Dilcher, Buffalo; L. B. Spencer, L. C. Raymond and M. A. Overholt, Welland.

Westerly, R. I.—B. Court Bentley, proprietor of the garage on Main street, will erect a new building on the site of the old structure. The new building will be 30 by 100 feet, with an addition in the rear 20 by 40, which will be used as a machine shop.

Philadelphia, Pa.—Negotiations are under way for a new home for the Longstreth Motor Car Co., which handles the Alco line of cars. Plans provide for a modern concrete structure approximately 66 by 125 feet at 2126-28-30 Market street. It is expected the building will

be ready for occupancy about September 1 of the present year.

Philadelphia, Pa.—C. Barrows has been appointed sales manager of the American Automobile Co. of Philadelphia.

Detroit, Mich.—C. R. Newby has resigned as Minneapolis Studebaker branch manager and is now connected with the new Everitt Motor Car Co.

Rochester, N. Y.—H. E. Sunderland, of Rochester, has opened a local office at 124 Cutler building. LeHardy Lindsay has been appointed to take charge of the service department of the garage in East avenue.

Somerville, Mass.—The Hill-Murchie Garage Co., at the corner of Medford and Walnut streets, is erecting a brick and concrete addition 50 feet wide and the depth of the present building.

Boston, Mass.—The George Sumner Co., Inc., agent for the Rayfield carburetors in Boston, has located at 755 Boylston street, where it has a well equipped mechanical department. J. K. Dalton is in charge of the offices.

New Orleans—The Duval Tire Rebuilding Co. has opened a plant at 345 Baronne street, with facilities for renewing injured or worn tires. The plant is in charge of S. P. Larabee. A feature of the service is the maintenance of a mechanician squad who will answer calls in any part of the city or parish to look after tire or other

motor car repairs, when trouble may have been encountered on the street or road.

Halifax, N. S.—Eighty motor cars were burned in a fire which destroyed the garage of Harman & Henry, Halifax.

Montreal, Que.—The Auto Tire Co., Ltd., handling the Goodrich product, has opened a Montreal depot at 594-596 St. Catherine street, west.

Willimantic, Conn.—Frank Powell, proprietor of the Windham garage, has leased the brick barn adjoining and is having the structure altered to make an addition to the garage.

White River Junction, Vt.—R. C. Hawthorn, for some years employed by H. A. Perkins & Co., who conducted a large garage at Maple and Union streets, White River Junction, Vt., has purchased the business.

Boston, Mass.—J. R. Bradford has become associated with Howard Blossom, of St. Johnsbury, Vt., who has formed the Consolidated Auto Co. there, composed of New Hampshire and Vermont agents and garage men.

Milwaukee, Wis.—N. R. New, sales manager of the Milwaukee branch of the Mitchell Automobile Co., has been appointed general manager of the branch, which is located at 528-534 Broadway. The branch house is now being tripled in size, two stories being added to the present

building and ground area considerably extended.

Buffalo, N. Y.—E. M. Greene has been appointed district manager of the Buffalo branch of the Metzger Motor Car Co.

Milwaukee, Wis.—R. R. Minton has been appointed sales manager of the Hustis Brothers Co., distributor for the King and Stevens-Duryea.

Louisville, Ky.—The Puncture-Proof Co. has moved into its new home, 209 East Broadway, where the factory and office will be maintained.

Milwaukee, Wis.—The Milwaukee Rubber Works, 472 Twenty-seventh street, has been incorporated after existing as a partnership for some years. W. L. Stewart is president and A. V. Boll is secretary and treasurer.

Boston, Mass.—Fred Graves, who has been connected with the Alvan T. Fuller Co., Boston agent for the Packard, for the past 7 years, has succeeded as sales manager A. T. McGarrett, who resigned last week.

New Albany, Ind.—The Borgerding Motor Car Co. has established a branch in Louisville and will maintain an office and salesroom at the southwest corner of Third and Breckinridge streets. This concern has acquired the agency for the Cole car, which was formerly sold in this territory by the Radcliff Motor Car Co.

Albany, N. Y.—Boulevard Garage Co., capital stock, \$50,000; to manufacture motor cars; incorporators, M. L. Ryder, S. W. Whitney, H. A. Rayno.

Amesbury, N. Y.—Hassett and Rogers, Inc., capital stock, \$18,000; incorporators, J. H. Hassett, C. H. Prescott, G. E. Collins.

Boston, Mass.—Lansden Electric Vehicle Co., capital stock, \$5,000; directors, A. B. Freeman, G. Freeman, W. H. Britton.

Boston, Mass.—Michigan Motor Co., capital stock, \$50,000; motor car business; incorporators, W. E. Burke, president; L. Furry, treasurer.

Brooklyn—Renson Automobile Co., capital stock, \$45,000; to manufacture motors; incorporators, A. F. Wilson, W. H. Kouwenhoven, A. J. Atchison.

Brooklyn, N. Y.—Broadway Penn Garage Co., capital stock, \$2,000; directors, H. Goldstein, M. Kaplan, H. Meisel.

Brooklyn—Ulmer Park Machine Works, Inc., capital stock, \$5,000; general machine and repairshop; incorporators, C. W. Lawson, F. W. Breitwitz, A. Johnson.

Buffalo, N. Y.—Pierce-Arrow California Sales Co., capital stock, \$100,000; to deal in motor cars; incorporators, W. J. Minehan, H. W. Huntington, L. F. Gilbert.

Chicago—Zillo Sales Co., capital stock, \$30,000; to manufacture motor vehicles and accessories; incorporators, J. O. Barker, F. A. Alexander, F. E. Alexander, Jr.

Cincinnati, O.—Eddy Automobile Co., capital stock, \$5,000; to operate garage; incorporators, H. T. Eddy, F. A. Wagner, A. C. Shattuck, D. K. Cox, A. C. Shattuck, Jr.

Cleveland, O.—Guide Motor Lamp Co., capital stock, \$100,000; to manufacture and sell lamps and fixtures; incorporators, H. J. Benson, W. F. Persons, W. H. Bunce, J. D. Kauffman, W. Louis Rose.

Cleveland, O.—Eiseman Automobile Co., capital stock, \$10,000; to sell motor cars; incorporators, S. N. Weitz, J. W. Camp, H. Pott, H. C. Cummings, A. Boehner.

Dayton, O.—Apple Electric Co., capital stock, \$300,000; to manufacture and deal in electrical ignition and starting systems; incorporators, V. G. Apple, O. Apple, J. C. Slager, C. Keifer, C. Bauman.

Detroit, Mich.—Everette Motor Co., capital stock, \$3,000,000.

Dover, Del.—Jiffy Auto Curtain Co., capital stock, \$100,000; to deal in motor vehicles and supplies; incorporator, F. H. Ilse.

Dover, Del.—Randolph Motor Truck Co., capital stock, \$100,000; to manufacture trucks; incorporator, I. B. Lipson.

Recent Incorporations

Dover, Del.—Merchants Motor Service Corp., capital stock, \$100,000; incorporators, G. B. Teaz, W. Voss, G. L. Oddy, N. W. Busby.

Dover, Del.—Everitt Motor Car Co., capital stock, \$3,000,000; incorporator, E. F. Everitt.

Duluth, Minn.—Zenith Tire Service Co., capital stock, \$50,000; incorporators, W. D. Rightmire, H. C. Russell, A. E. Rightmire.

Fall River, Mass.—Eckberg and Place Garage Co., capital stock, \$7,000; directors, V. J. Eckberg, E. Place, R. Place.

Herkimer, N. Y.—Rowalko Garage Co., capital stock, \$4,000; incorporators, W. E. Rouse, Jr., W. J. Walrad, G. Smith.

Huntington, N. Y.—Bergen Garage, Inc., capital stock, \$5,000; incorporators, A. S. Bergen, H. F. Doughty, J. H. Doughty.

Indianapolis, Ind.—White Automobile Co., capital stock, \$2,000; incorporators, R. D. Egglefield, G. W. Fuller.

Indianapolis, Ind.—Smart Auto and Mfg. Co., capital stock, \$50,000; to manufacture motor cars and parts; incorporators, O. S. Schrader, D. W. Reed, I. H. Shelton.

Louisville, Ky.—Commercial Motors Co., capital stock, \$10,000; to deal in and rent motor cars; incorporators, H. B. Fitch, R. J. Hurt, R. E. Scharf.

New York—East New York Motor Cab Co., capital stock, \$5,000; incorporators, J. Rauch, F. Rauch, D. Barnet.

New York—Mercedes Selling Branch Co. of America, capital stock, \$5,000; general motor car business, incorporators, A. K. Alnay, H. J. Wehman, G. Hallett.

New York—Pearson Reciprocating Motor Co., capital stock, \$100,000; incorporators, G. O. Pearson, C. L. Herrington, J. A. McCarron.

New York—Gas Engine Self Starting Co., capital stock, \$1,000; incorporators, G. M. Auten, H. C. Farnum, L. C. Altemus.

New York—Resilio Tire Co., capital stock, \$100,000; to manufacture motor car tires; incorporators, E. T. Wallace, T. S. Williamson, L. H. Starkey.

New York—Parker Garage Co., capital stock, \$3,000; incorporators, C. T. Green, E. B. Griffin, E. M. Morrison.

New York—Service Recorder Co. of New York, capital stock, \$10,000; to manufacture time recorders, speedometers, etc.; incorporators, H. F. Seymour, F. Seymour, B. N. Levy.

New York—Moloney Electric Co., capital stock, \$700,000; to manufacture and deal in electric supplies; incorporators, I. J. Wiel, E. Blumenthal, J. H. Muller.

New York—Diamond Motor Car Co., capital stock, \$10,000; to deal in motor cars; incorporators, C. W. Jaycox, F. Davis.

New London, Conn.—Todd Rubber Co. of New London, capital stock, \$2,000; to manufacture rubber goods; incorporators, W. J. Todd, A. Wurts, A. P. Gunn.

Ogdensburg, N. Y.—Crescent Garage Co., capital stock, \$6,000; incorporators, J. O. Spear, C. W. Weed, W. Golden.

Penn Yan, N. Y.—Beckwith Trucking Co., capital stock, \$10,000; to deal in motor cars and supplies; incorporators, H. A. Wagner, J. Beckwith, G. E. Beckwith.

Philadelphia, Pa.—Merchants Motor Service Corp., capital stock, \$100,000.

Pittsburg, Pa.—Pitt Motor Truck Co., capital stock, \$200,000; incorporators, J. E. Douglass, E. P. Douglass, W. S. Phillips, F. O. Brandt, J. E. McCalmont.

Portland, Me.—Maine Motor Car Co., capital stock, \$50,000; incorporators, A. S. Hinds, E. Brewer.

Portland, Me.—Presto Inter-Rim Co., capital stock, \$200,000; to deal in motor cars; incorporators, M. A. Thurston, H. P. Sweetser.

Portland, Me.—Forest City Automobile Co., capital stock, \$10,000; to manufacture and deal in motor cars; incorporators, J. A. Clarke, W. B. Clarke.

Springfield, Mass.—Blue Ribbon Garage Co., capital stock, \$2,000; directors, Harry Bland, A. Karp, J. G. Gottesman.

St. Paul, Minn.—White Bear Auto Co., capital stock, \$25,000; incorporators, A. J. Diamon, A. G. Albrecht, J. C. Larson.

Tampa, Fla.—Mitchell Auto Sales Co., capital stock, \$15,000; incorporators, M. B. Hubbard, F. M. Williams, E. Van Duzen.

Welland, Ont.—Cataract Rubber Co., capital stock, \$250,000; directors, E. J. M. Block, J. Dilcher, M. A. Overholt, L. C. Raymond, L. B. Spencer.

Wilmington, Del.—Storage Battery Safety Lamp Co., capital stock, \$550,000; incorporators, G. W. May, A. Smith, M. E. Dorsey.